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EDITORIAL NOTES.

No Southport Meeting this Year.

IT will not come as a surprise, under the prevailing circumstances, to learn that the Council of the Institution of Gas Engineers have definitely decided, with the concurrence of the President (Mr. John Bond) and his Chairman and Committee, to "carry forward" to 1916 all arrangements made for the holding of the meeting at Southport in June this year, and to maintain all office-bearers in their existing positions for twelve months beyond their otherwise legitimate term of office. There will be simply a business meeting in London this year, for the passing of the Council's annual report and the financial statement, and for receiving an account of their stewardship from the various Committees, which accounts are not likely to be marked by any considerable wealth of matter, seeing that the members of the Committees have been very busily engaged with exceptional business claims, or have been employed in otherwise serving their country. At any rate, all the members of the Committees will have had their thoughts fairly well preoccupied the last few months, without having to devote themselves to matters which could well be deferred to a more convenient season. The department of the Leeds University in which the industry is interested, and over which Professor Cobb so diligently and ably presides, has no doubt been pursuing the even tenor of its way, and may have something to report showing the stages reached in the special matters under research. Beyond these things, there will be nothing to call the members to London.

The Council have followed the precedent of the British Commercial Gas Association in their line of action in respect of the annual meeting and of the officers; and they have done wisely. Far better is it to at once resolve not to hold the annual meeting at Southport, than—while the country and practically the whole world is in the midst of a crisis more momentous than any in history, and one cannot positively foretell the course of events—to proceed with the arrangements, and probably have the meeting falling considerably short of its predecessors from inability to attend on the part of a large number of members. The times are anxious enough in the present in regard to trading matters, though, under the circumstances of current business, gas men are looking forward expectantly and confidently. But what with the thinning-out of official and workmen lines through the response to the "Call to the Flag," what with the uncertainties that surround the coal position, and what with the care that the marketing of residual products demands, gas engineers and managers would not—unless there is a marvellous change in conditions between now and June—want to be away from home for any length of time at the latter period, though all would feel the obligation that rested upon them to journey to Southport to support their President. But the greater obligation may then be official duty; and to have the engagement postponed will be a relief to many. The members generally will now look forward to meeting in 1916, in a time of peace—a peace effected with honour to this country and her Allies—and a time with prospects of the brightest.

London Gas Companies' Working Last Year.

IN another part of the "JOURNAL" will be found a table giving the financial results of the working of the three London Gas Companies in the year ended on the 31st of December last, with the items of revenue and expenditure worked out at per 1000 cubic feet of gas sold. For the sake of comparison, similar particulars for the two preceding years are given. The table will supplement the fuller analyses of the past year's working prepared by Mr. F. J. Bradfield, the Secretary of the Commercial Gas Company, which, by his courtesy, we were able to give last week and in the number for Aug. 25, 1914. It will be seen that the capital (including premiums) engaged in the supply of gas on Dec. 31 amounted to £40,499,244 17s. 2d., that the total income was £7,580,592 1s. 10d., the expenditure £6,142,617 5s. 7d., and the gross profit £1,437,974 16s. 3d. The last-named amount was £3 11s. 1d. per cent. on capital and borrowed money, and £27 17s. 1d. on the total gas-rental. Upon the basis of each 1000 cubic feet of gas sold, the figures are: Capital, 18s. 8·04d.; income, 3s. 5·93d.; expenditure, 2s. 9·98d.; profit, 7·95d. Those for the year 1913 were: Capital, 18s. 5·46d.; income, 3s. 7·66d.; expenditure, 2s. 10·53d.; and profit, 9·13d.

The following table shows the carbonizing results of the three Companies, so far as they relate to the manufacture of gas from solid raw material only; and it will be noticed that the mean make per ton last year was 12,530 cubic feet, as compared with 12,373 and 12,420 cubic feet in the two preceding years.

Name of Company.	Coke.	Breeze.	Tar.	Am. Liq.	Gas.
	Cwt.	Bushels.	Gallons.	Gallons.	Cub. Ft.
GAS LIGHT AND COKE .	12·36	6·02	10·47	32·22	12,392
SOUTH METROPOLITAN .	12·34	5·61	9·55	41·28	12,543
COMMERCIAL	12·50	4·10	12·62	39·28	13,775
Mean per Ton . .	12·36	5·75	10·26	35·95	12,530

Coal Transport, Prices, and Hours.

THERE is really little change in the coal position. All we know is, in addition to what transpired prior to a week ago, how far the Government are prepared to go in the relief of the situation, supplementing such relief as will come by ordinary process the nearer approach is made to Spring. It seems pretty clear that the Government have no intention of putting maximum rates for freightage, in place of the so-called "market rates," on the released interned ships for supplying coal to the public services in London and down South, but that they intend to let the gradual increase of tonnage automatically bring about the reduction of the "market rate." Whether this remedy will prove quickly effective will depend upon the amount of tonnage that the Government can promptly set afloat. But the flaw in the remedy is that it is within the power of the shipowners to themselves divert tonnage from the Tyne-to-London route, and so help to maintain the rates. In regard to the railways, the prospects have improved. Quite a good supply of waggons have been run up to the colliery areas; and the congestion difficulties are now being steadily overcome. In fact, Mr. Runciman stated last week that the Railway Executive Committee had restored the conveyance of coal to London by rail to practically what it was in the corresponding week of last year.

Concerning the increase in the price of coal, some of the colliery owners will hardly look upon Sir Arthur Markham as a personal friend; for in the House of Commons last week, he made an exposure which they will not like. From the beginning of the war, Sir Arthur has shown himself, in addition to being one of the largest coal owners sitting in the House, to be a true patriot; and he has not had, and will not have, anything to do with the undue enhancing of the price of coal to the community or to industry. The Prime Minister, in the opening part of the debate on the rise of foodstuffs and other necessaries, stated that there had only been a 15 per cent. increase in the price of coal. This was something like his 10s. freightage from the Tyne to London, which, on the morning following his speech, was back again to 13s. Interested people seem easily to hoodwink Government Departments, and Government Departments innocently mislead the Ministers who draw upon them for data. The 15 per cent. referred to household coal; but what applies to household coal will, excepting contract supplies, apply to other descriptions. In the Midlands and Yorkshire, Sir Arthur Markham said, the price of coal had advanced

70 to 100 per cent., while the railway charges had only increased by 6d. to 9d. per ton. Then came from Sir Arthur a confirmation of an opinion expressed by Sir Corbet Woodall, when coal prices went up inordinately during the time succeeding the great coal strike of 1912. It will be remembered that Sir Corbet, in February of the following year, suggested that the time had arrived when the Government ought to step in, and put some restriction upon the coal owners' greed for profits. He pointed out that it is not equitable that there should be control over the suppliers of gas (of which control he did not complain), while the coal owners, from whom the material is purchased from which the gas is made, are under no control whatever. Now Sir A. Markham, in calling attention to the 70 to 100 per cent. increase in the price of household coal in the Midlands and Yorkshire, says that State control is quite feasible and defensible; that there is no justification for the present high prices; and that 1s. 6d. to 2s. per ton would amply cover the increased cost of production. Coming from such an authoritative quarter, and one so heavily interested, the statement cannot be ignored; and, in a few words, it disposes utterly and completely of all the futile defence of the coal owners that has been attempted in the section of the Press devoted to their interests. The Government could not ignore such authority; and they have promised an immediate inquiry into the qualities and relative prices of coal, and, if necessary, they will take prompt action in regard thereto. If the Government do this, it may yet be that the suggestion made by Sir Corbet Woodall early in 1913 will materialize. If it does, it is hoped it will not be a temporary materialization, but a permanent one; for men who will take advantage of a war of the present magnitude, and with such grave influences upon the people, to load up profits on coal in the way described by Sir Arthur Markham may be relied upon to do it whenever occasion allows.

Another matter that has been made clear as to the intentions of the Government is that of the suggested suspension of the Eight Hours Mines Regulation Act. Our friends in the Manchester district and in Scotland who are desirous of interviewing the Prime Minister on the subject may as well save themselves the trouble of a journey to town; for Mr. M'Kenna, in the House yesterday week, made it abundantly clear that until coal owners and miners thought suspension necessary in order to meet national requirements, it would be undesirable to interfere in the manner suggested, with a view to increasing output. One can well see that if there ever was a time, or is likely to be a time, when the suspensory power should be put into operation, that time is the present. But is it even necessary now, if the men would put in full working days and hours? Already the miners in some areas are doing something to compensate for the absence of the men at the front, by taking advantage of the provision in the Act which enables them to work one hour overtime for sixty days in the year; and men in certain districts are also working more days per week than is the custom in normal times. But they are not working full time. If the men would only put in their full statutory days and hours, they would be serving the country well; and there is not to-day the excuse that there would be no advantage in working more time owing to the shortage of railway waggons. There is no such shortage now. Only as a last resort will the Government suspend the Act, seeing that it would involve a vast alteration of organization and working arrangements, which would be useless if there is a better way to expedite output—and there certainly is the better way in full-time working.

An Injustice at Huddersfield.

THERE are municipal corporations and municipal corporations; there are gas committees and gas committees. And it is a good thing for the reputation of local government that there are municipal bodies who, in their actions, show that the men composing them are loyal to their constituents and to themselves, and would scorn any proceeding that is not marked by the purest of intentions and by the fullest sense of justice. Such authorities serve to protect local government against general condemnation, on the several grounds which can be found in connection with not a few other local bodies. It is to the discredit of local government that in some areas it is run on party lines; and many a good scheme is defeated and destroyed, and many an indifferent one is run through, merely because it suits the cards, or because it is the product of the whims and fancies, of some particular clique or group of faddists or extremists in the local body. In such so-called governing bodies, there is too much playing at the game of "follow my leader," instead of displaying individual judicial intelligence and discrimination. It is a pity, and it is a reproach to an institution that ought in each locality to be an exemplar in the matter of a high standard of directive efficiency. It is a notorious fact that, in some areas, through the changing constitution of municipal bodies, the collective competence and efficiency in local government have depreciated considerably. Competent and efficient members have been displaced by elements of the reverse order. This, however, is the fault of sections of the ratepayers who do not appreciate the qualities required for the administration of their local affairs, or are led astray by the most banal of claptrap. But administrative efficiency suffers, and especially where there are trading concerns under the domination of committees who are actuated by influences affecting parties or cliques, and not for the common good. The executive officials of some such bodies would gladly change their positions for appointments under a board of directors who are not subject to change of composition and external influences as are municipal councillors, and whose tenure of office, being continuous at the discretion of the shareholders, enables them to become properly educated in administrative functions, and to pursue those functions in a perfectly impartial and liberal-minded manner, and in the interests of all concerned—the while treating justly officials, staff, and workmen.

An extraordinary illustration of what appears to us to be a gross miscarriage of justice comes from Huddersfield; and when we say that it involves (to state the matter in cold, plain truth) the discharge, with the payment of three months' salary in lieu of notice, of Mr. Edward A. Harman, from his position of Engineer to the Corporation Gas Department, the whole gas profession, among whom Mr. Harman is held in the sincerest respect and regard for both personal and professional qualities, will be desirous of learning the specific grounds for such a step being taken, and with a record of eighteen years' service, and financial and working results of the order set out to-day in our news columns. But the Gas Committee have not, and we opine dare not, put in writing any specific charges; for Mr. Harman's professional work is in the safe keeping of the printed records of the results achieved by the department. The trouble, it appears, began with a reconstitution of the Gas Committee, and with an inflated belief of certain newcomers that they were capable of formulating an administrative policy that would do much better than the excellent record that marks past administration; the greatest sin of the late Engineer is that he refused, without specific charges were made and proved against him—refusal being made more than once—to give effect to the suggestion that he should tender his resignation. He preferred that with the reconstructed Committee should rest the ignominy of discharging him without having given him a categorical statement of the causes of their desire to terminate his services rather than that a tendering of his resignation should give, by inference, support to any supposition that there were any solid grounds for the severance of the official connection. The circumstances under which the severance has now taken place does not, on the evidence before us, redound to the credit of the present Gas Committee or to their sense of justice.

The whole action of the Committee, as we see it from the available information (the Committee on their part do not seem to have allowed much to be made public), appears to have been paltry in the extreme, and, in the circumstances of the present time, most imprudent. The summary of, with extracts from, a couple of reports (the full text of which is in our possession) that Mr. Harman made—consisting of answers to certain interrogatories addressed to him—will indicate [see p. 460] an attempt on the part of the Committee to manufacture a case from petty points, which, to one conversant with the technical management of a gas-works, are proof of the technical incompetence of those who framed the inquiries. We find in those inquiries, so far as they affect Mr. Harman personally, nothing but pin-pricks, while they were intended to be much more. There is no evidence of lack of technical skill or supervision, nor any neglect of responsibility on the part of the Engineer. The financial and working records would be the answer to any such charges. Good service is the testimony of the statistics; and no Committee can destroy that testimony. There is a

question as to the responsibility for the purchase of certain coal; Mr. Harman is quite clear that the responsibility does not rest with him, but with the new Chairman. As to the imprudence (apart from the injustice) on the part of the Committee in taking this action at the present time, war conditions, with the situation in respect of coal, and the uncertainties regarding the coke, tar, and sulphate of ammonia markets, and with a considerable quantity of work in progress, ought to have been sufficient, unless there was absolute misdemeanour, to have stayed this drastic proceeding. The foolish action of "swopping horses while crossing the "stream" is reflected in the present piece of indiscretion; and, in fact, the Committee appear to have lost all sense of responsibility. We are sorry for Mr. Harman. This mode of terminating eighteen years' service is not a happy one; it is not the manner of men of true British spirit and refined feeling to discharge without giving definite reasons for the proceeding; and it will not, unless the Committee have now the strength to give a public explanation of their action, and reply categorically to Mr. Harman's reports, do anything to raise in the estimation of the professional men of the gas industry the attractions of service under the Huddersfield Corporation.

Not only in regard to "discharging" their Engineer at such a time as the present have the Committee shown a deficiency in their sense of responsibility, but in other respects. There is evidence of it in their attitude towards coke. At the meeting of the Committee last Wednesday, they reduced the price of their chief residual from 10s. to 6s. 8d. per ton—during the war, and although Huddersfield is in a state of phenomenal prosperity! At the same time, they lowered the price of breeze from 3s. 4d. to 2s. 6d. Such action, in view of the current position of the fuel markets, is enough to make every other gas administration in the country laugh derisively. Are the Committee in office for the purpose of serious commercial management, or the contrary? Throughout the country, good prices are being obtained for coke, and the best possible coke revenue will be required by most gas-works in view of what is likely to happen in connection with the next contracts for coal, and the general pressure on the industrial position from other quarters. At the same time, the Committee advanced the wages of the yard labourers from 26s. to 28s. a week of 48 hours, and appointed a Special Sub-Committee to consider an application from the carbonizers for further increases. With the enhanced cost of coal delivered, with the position of the residuals markets, with higher wages, and additional taxation, the prospects of the Huddersfield gas undertaking under municipal control do not appear to be the most hopeful. The Committee's methods of improving the administration of the Department do not strike us as showing any remarkable talent or breadth of view.

Lighting Fittings and Architectural Designs.

PRACTICALLY every possible subject, from coal carbonization to the consumers' uses of gas, has been discussed by the technical organizations of the gas industry; but, rummaging through our mind, we cannot recall an instance when any thorough discussion of the question of the design of gas-fittings for private or other lighting has been brought under collective consideration. Indeed, we can freely admit that the gas-supply industry (as such) has not given any extended thought to the matter. It has been left much to the fittings manufacturers to provide those things for which there is demand; and we give them their due that, in design, they have done their work very well. More especially is this true of recent years, during which they have left their inveterate methods of straight tubes and angles, and given to the gas user some of the choicest examples of the metal workers' art, and of a variation from which all tastes can be gratified. Perhaps the chief reason for the want of diligence in this question of fittings design on the part of the gas-supply industry may be laid to the account of a now disestablished custom—the custom which at one time prevailed—of declining to have anything to do with more than the provision of gas up to the meter stage, and taking no responsibility, and incurring no liability, beyond. This custom has passed; but excepting for special cases and conditions, the design of gas-fittings is still left to the manufacturers.

The question of design—both in regard to private and public lighting fittings—was raised in a paper that Mr. F. W. Thorpe read last Tuesday before the Illuminating Engineering Society, to which Society there is indebtedness for having from time to time opened up fresh ground for consideration. It is strange that in view of the millions and millions of lighting fittings that there are in use in the country (the production of which has built up an immense industry), the subject of their design has been kept so much in the background. The credit for bringing it forward, though somewhat late in the day, is due to Mr. Thorpe; but, in awarding him the credit, there is no need to accept all his conclusions. One view that he took was, to put it briefly, that co-operation is much needed between the architect, the engineer, and the fittings designers, with the object of raising the artistic, as well as the practical, aspects of illumination to a higher plane. With that view up to a point we quite agree. Co-operation is all right for the design of some classes of fittings, so long as co-operation does not mean the placing of the practical side, which deals with illumination efficiency, in a subordinate position to the appearance of the fitting. We are rather afraid, however—considering the spirit of the paper throughout, and the obvious purpose of the contribution, which was a plea for greater harmony between lighting fittings and architectural feature and environment generally—that the author's intention is that the architect should be supreme in the matter. He says, in fact, that the architect should have the selection of the type of fitting, and that the architect should ensure, by co-operation with the engineer, that it embodies modern practice as regards efficiency. It is pretty certain who, under those conditions (unless he is an architect of the broad-minded type of those who spoke at the meeting last Tuesday), would be top dog in the settlement; and therefore which consideration—style or illumination efficiency—would have superior weight.

Of course, the paper and the contentions are only applicable to mansions, public buildings, and large establishments where an architect is engaged to carry out a complete scheme of erection or reconstruction, and not to the myriads of houses that are let on rental, and the tenants of which have to provide their own fittings from their own purses. In work where an architect has control, the author claims that the lighting scheme should form part of the decoration. A lighting scheme properly executed can contribute largely to the beauty of a room, to the revealing of its charms, to promoting a sense of comfort, and to utility. But there is no occasion for all the harmony (even to the gas or electric light fittings) with which the author appears to be obsessed as with an extreme ideal. Too much harmony in appointments, striking maybe on first blush, is apt to get monotonous and depressing; and we are at one with the speaker in the discussion who held that there is charm in contrast as well as in harmony, and perhaps more so. Some people seem to be absolutely enslaved by the notion that decoration should be throughout of this or that style or period; and when lighting fittings are included, then we have arrived at the very limit of the cult of harmony in architectural and decorative feature. But while we do not think it necessary that pure uniformity (which can be very obtrusive) should prevail, we are very much in sympathy with the cultivation among householders of the demand for more refined and artistic lighting fittings which shall be a credit to a room by day, and render efficient service in, and contribute to the amenities of, the room by night. This can be done without necessarily (though we do not despise, but admire it for its beauty) copying dead men's work in days when other lighting methods prevailed. Twentieth Century lighting agents should have Twentieth Century fittings, said a speaker at the meeting; and there is truth in this if illumination efficiency is the predominant consideration. The designers have not done badly in appreciating this; but scope still exists for much improving work.

There is a fallacy resident in some quarters that art has altogether ignored gas-fittings. But we never expected to find it a fixed idea with a professional man of the standing of Mr. P. J. Waldram. He apparently has been so absorbed in other matters that he has never observed a decent design in the shape of a gas-fitting; and his notion appears to be that such fittings are a commodity only obtainable from the local ironmonger. He remarks: "One can get electric "light fittings of fairly good design, but the majority of gas-"fittings at present can only be obtained from the iron-"monger. I think there is greater scope for design in gas-"fittings even than in electric fittings." Mr. Waldram's own words are proof positive that he does not know in this particular anything about the subject. As much art has

been displayed in the design of gas-fittings as in that of electric light fittings. If Mr. Waldram had seen the display of fittings at the National Gas Exhibition in 1913, or at the stand of the South Metropolitan Gas Company at the Ideal Home Exhibition that year, if he had seen the fittings in any show-room of a progressive gas company, if he had made proper inspection of the show-rooms of our fittings manufacturers, he would have saved himself from publishing any such erroneous idea as that to which he gave expression as being a rooted belief. It is true that, in connection with gas lighting, there is an abundance of fittings that are cheap and not ornamental. But the social fabric is composed of only a small percentage of people who can afford to employ architects and illuminating engineers, and to comply with styles and periods in all appertaining to decoration and appointments. The mass of the people have to accept their pockets as arbiters between their preferences and what they can have; and the gas-fittings manufacturer has to produce to meet the enormous demand controlled by the pocket, and by no other consideration. But this does not justify an assertion, made in ignorance, as to poverty of design in gas-fittings.

A few more words respecting the harmonizing of lighting equipment to surroundings; but this time in connection with public lighting. Mr. Thorpe complains that, in the lighting of streets, squares, and open spaces, the decorative possibilities have not yet been adequately considered. There is very little room for the æsthetic in connection with public lighting. It is as much as some public authorities will do to open their purses wide enough to allow a bare profit to the suppliers of the lighting agents. The author sees some difficulty in attaining his ideal in connection with existing streets and squares; but he does think that, when new streets and squares are being planned, the lighting should be simultaneously considered, so as to conform with the neighbouring architecture, and so make one harmonious whole. It so happens that the lighting arrangements sometimes precede building in the laying out of new territory; and if lamp posts and fittings are to be erected to conform with every architectural mode upon which the fancy of owners turns, then we should get a most fantastic, chaotic, and inefficient system of lighting, and altogether beyond the paying views of the ratepayers. We do not like to see our streets disfigured by ugly lamp standards; and many of the old-fashioned types ought, with systematic regularity, to give place to new. But practicability and common sense suggest some style that, while not an eyesore, would not make the lighting system unduly costly, as would Mr. Thorpe's ideal of conformity of lighting equipment with neighbouring architecture. We shall be having the craze for harmonizing effects carried to such a length that some people will be wanting harmony in street architecture; and nothing tires one more than to walk through streets where the houses are absolutely uniform. The lamp standard is a different matter. Practical considerations make uniformity in them desirable.

A further complaint is that there have been few attempts to design suitable street lamp-posts; and Mr. Thorpe is doubtful as to the ability of borough engineers and those who purchase such articles to make suitable choice. He thinks it desirable that designs should first be submitted to an architect before purchase is effected. We are not sure that architects are altogether the best persons to whom to submit lamp-post designs for adjudication. We remember, when Sir George Livesey was desirous of obtaining a suitable lamp column for improving the lighting of the main thoroughfares of South London, he sought designs from architects and others. If he had specially asked for designs for standards that would afford ample lodgment for dust, mud, and rain, be difficult to paint, and costly to cast, he could not have been better served. But it ended in him designing a column himself upon which he conferred the name of the "Eddystone," which was suitably descriptive. A neat and graceful lamp column is what is required in the streets. Efficiency in this matter must stand before elaboration.

Chemical Manufacturers and the Dye Scheme.

A fortnight ago, remark was made upon the belated claim that the chemical manufacturers, who had not moved a hand in he matter of helping forward a dye-producing scheme for this country, should be asked by the Government for their approval (which is delightfully considerate of them), and that the Government ought to consult with a Committee composed of chemical manufacturers. This eleventh-hour awakening is both interesting and amusing. The "Chemical Trades Journal" has noticed our comments; but, while making all manner of excuses for the chemical manufacturers for not entering into this dye business before, it forgets to explain why they did not come into the field somewhat earlier, subsequent to the start of the war, instead of waiting until they saw the prospect of a large undertaking actually in our midst with one aim and object—that of meeting the requirements of the home dye-using industries. It seems, however, according to our contemporary, that the chemical manufacturers want something very substantial and concrete in the way of protection against cheap dye-stuffs from Germany. We have no doubt they do; but why wait until now before saying so? Of course, it is generally known that the chemical manufacturers are extraordinarily fond of protection—for their own interests, and that they do not mind to what lengths they go to get it, even to asking Parliament to confer upon them special privileges in the markets for their raw materials. Our contemporary also tries to make light of our references to sufficient protection being afforded to the national company by the loyalty of the dye users. It does not think the promise of the "loyalty" of the users "would be of much use" to the chemical manufacturers; they would want something much more substantial than this. Those who know the chemical manufacturers will not be astonished at the statement. But we were speaking not of the loyalty of dye users to the chemical manufacturers, but of that of the users holding capital in their own dye-producing company. Cannot our contemporary see where its criticism fails? But there is little use arguing the matter, seeing that, so far as the chemical manufacturers are concerned, they are—too late.

Official Salaries.

In his capacity of Elective Auditor for Manchester, Mr. S. Norbury Williams has at different times discussed questions possessing an interest far beyond his own particular sphere of activity. An instance of this occurred recently, when a lengthy article written by him appeared in a local paper; the origin of the communication being stated to be the receipt of many letters expressing the view that the sacrifices made by the well-paid officials are not on a scale commensurate with those which the war has entailed on a great proportion of the citizens. Mr. Norbury Williams asks, "Should officials' salaries be reduced?" But a glance down the article does not reveal any direct answer. Probably he prefers that the readers should find the solution themselves; and the matter may be left at that. It should not, however, be unfair to assume that the salaries were originally fixed with the idea of striking a "mean" figure—the word "mean," is, of course, not intended here to imply "stingy." If they were reduced below the "mean" in bad times, would there be a corresponding readiness to raise them above the "mean" in good times? This is what one would be inclined to anticipate the officials might expect. As the writer of the article shows, deductions are already being made from all wages and salaries, on a sliding scale, reaching 5 per cent. in the case of the best-paid officials; and this money is handed over to the relief fund. In other ways, also, Corporation officials must be affected by the war. Everybody is affected by it, of course, though, as Mr. A. M. Paddon, referring to gas undertakings, remarked when addressing the Brighton and Hove General Gas Company, "the incidence is not equal." Mr. Norbury Williams himself tacitly admits that all the ratepayers of Manchester (direct and indirect) are not suffering in pocket to as great an extent as those who have written to him complaining of official salaries.

Upholding an Agreement.

The Swansea Rural District Council have now learned, through the Court of Appeal, that their attempt to wriggle-out of an agreement entered into in 1909 with the Swansea Gas Company, as to the lighting of certain territory, has ended very properly in failure. When the matter was before Mr. Justice Warrington last June, he declared that the agreement of 1909 had been superseded and rendered inoperative by something that occurred in 1910 in the corridor outside the House of Lords Committee rooms, when the Company were engaged in obtaining through a Provisional Order certain powers which were essential to giving effect to the agreement. It was difficult to see the matter from the point of view of Mr. Justice Warrington—inas-

much as the Order was a necessary instrument to the agreement; and it was hardly likely that the Council would within such a few months have desired to annul the latter. The Court of Appeal has upheld the agreement; and so the Gas Company have succeeded. The whole change of front of the Rural District Council appears to have been due to a desire to carry out an electric lighting scheme, powers for which they possessed long before the agreement of 1909 was executed; but they had covenanted with the Gas Company not to supply current for lighting purposes—only for power purposes. The Council in their efforts to escape from the agreement, which, we presume, they had with honourable intention entered into, contended that they had no right to divest themselves of their powers in this way without the consent of the Board of Trade. They still held the powers; they only divested themselves of the right to exercise them for a certain number of years. Mr. Justice Warrington, however, was in favour of the submission of the Council on this head; and the Gas Company, as we understand the matter, have given way to that extent. The position, therefore, now appears to be that the Council have to perform all their contractual obligations with the Company as made in 1909; but they may, if they so desire, compete in the area in question with the electric light. We doubt whether the Council will venture to lay down plant while the agreement continues under which the Gas Company are to light the districts in question.

Nitrogen Products.

Several people who speculated somewhat heavily in the shares of Nitrogen Products and Carbide Company when it was launched feel, when they look at the value of their holdings to-day, that in this direction they have made one of the mistakes of their lives, and are very disappointed with the position. Not only do they think they have been badly hit, but there is a feeling that there is good ground for grievance against those who promoted the Company either for not looking with critical fulness into the position, or for keeping from intending investors a full account of the actual position of the patents. The "Financier," it may be remembered, recently criticized certain aspects of the Company [*ante*, p. 128]; and, following this, other people have been making uncomfortable inquiries, which all go to show a gathering discontent. Someone, signing himself "Ammonia," has written in quite a breezy style to the "Financier," with the view of calming matters; but he has not succeeded. Quite airily he says that to him there is no vital importance attaching to the point as to whether the patents covering the manufacture of cyanamide have nearly, or have quite, lapsed, "as without the vast water power in Norway, which is controlled *to a great extent* by Nitrogen Products, it is *almost* impossible to manufacture cyanamide economically." We take it the Company paid a substantial sum for the patents; and, if so, to the shareholders it matters materially whether or not the patents have a good unexpired period to run. There will be small comfort to the shareholders in having water-power substituted for protecting patents. "Ammonia" shows by the wording of his statement that the Company do not possess complete control of the water power of Norway. "To a great extent" is a phrase that indicates there is more water power available than that possessed by the Company. The statement, too, that it is "almost" impossible to manufacture cyanamide economically without water power is a confession that there are other means of economical production; and "Ammonia" must know that the production of power from other sources has of late years been rapidly advancing in economy. This and other parts of the letter have not done much to compose the dissatisfaction that exists.

Points for Employers.

During the last few weeks, while attention has to so large an extent been diverted elsewhere that they are likely to receive less attention than the facts deserve, there have been two important points decided by the Court of Appeal in connection with workmen's compensation. In the first case, a stableman, while ascending to a hay-loft, slipped from the ladder, and so injured his head that he died shortly afterwards. The County Court Judge found that at the time of the accident the deceased was under the influence of drink—that slipping off the ladder was a risk incidental to his employment, but that the accident was due to his intoxicated condition. He, however, held that the accident, though due to "serious and wilful misconduct," was none the less an accident "arising out of, and in the course of," his employment, and so awarded compensation to the dependants. This view the Court of Appeal sustained; it being remarked that it was the man's primary duty to cut chaff, and for this purpose to go to the loft by ascending the ladder. In the second case, a miner who had lost an eye in an accident was paid compensation for some time, after which an agreement in writing was entered into between the man and his employers by which he agreed to accept in settlement of all claims under the Act a lump sum of £85. The agreement was sent to the Registrar, and after the lapse of the statutory period (no objection having been received) it was registered. Meanwhile the workman (unknown to the Registrar or the employers) had died, from causes altogether outside the accident. Letters of administration of the estate were granted to a daughter, and on application to the County Court Judge she was given leave to issue execution. The employers appealed; but the Court of Appeal held that the decision was right—that there was nothing in the Act requiring the Registrar to have proof that both parties were alive when registering the agreement, and that the workman had under it a right which became that of his administrator.

A Case for the Sulphate of Ammonia Committee.

Among the farmers of seven southern counties, the Publicity Department of the London and South-Western Railway are circulating a pamphlet which gives some attractive information concerning the cultivation of sugar beet, and its possibilities and the derivable profits. Nowhere, however, in the pamphlet do we find any reference to sulphate of ammonia; but what is found is that manuring in the following proportions is recommended: 12 to 15 tons of farmyard manure in the autumn, 3 to 5 cwt. of superphosphate, 1 cwt. of sulphate of potash, and 1 cwt. of nitrate of soda. The Sulphate of Ammonia Committee will no doubt look into this matter, and see that the farmers of Surrey, Hants, Wilts, Dorset, Somerset, Devon, and Cornwall learn something about the beneficial effects of sulphate of ammonia in the growing of beet.

Presentation to Mr. Edward Allen.

A pleasing incident marked the meeting of the Directors of the Liverpool Gas Company last Tuesday. The Chairman had already felicitated the Engineer, Mr. Edward Allen, M.Inst.C.E., upon his jubilee of service with the Company; and the Directors followed this up by presenting him with a candelabrum bearing the following inscription:

Presented to EDWARD ALLEN, Esq.,
by the Directors of the Liverpool Gas Company,
as a Mark of their Confidence and Esteem, on the
Completion by him of 50 Years in the
Service of the Company,
1915.

Mr. Allen's professional colleagues will, we think, agree that such an appreciation of his ability and high standard of integrity is well merited.

New Gas Association at the Antipodes.

We learn from the "Intercolonial Gas Journal of Canada" just to hand that the inaugural meeting of the New South Wales and Queensland Gas Engineers and Managers' Association was held in Sydney on the 29th of October. About forty engineers and managers were present; and the following office-bearers were elected: President, Mr. Thomas O. Morland, Manager and Engineer of the North Shore Gas Company; Vice-President, Mr. R. J. Lukey, Secretary of the Australian Gaslight Company; Treasurer, Mr. A. Wilson, Engineer of the Company; and Secretary, Mr. H. Tindale, Assistant-Engineer of the Company. Auditors, Mr. S. W. Durkin, Distributing Engineer of the Australian Gaslight Company, and Mr. S. J. Janes, Secretary of the North Shore Gas Company. The members of the Council are: Mr. J. C. Alexander, a Consulting Gas Engineer; Mr. J. A. M'Auliffe, Engineer and Manager of the Manly Gas Company; and Mr. J. M'Kenzie, Engineer of the Newcastle Gas and Coke Company. The day after the meeting the members visited the North Shore Gas Company's new works at Oyster Cove, and the Australian Gas Company's works at Mortlake. The visitors were much interested in all they saw at both places, where they were hospitably entertained. On returning by the steamer toasts were proposed and speeches made; and the members dispersed after a most enjoyable meeting.

At the ordinary meeting of the Institution of Civil Engineers, to be held this evening, a paper is to be read by Mr. H. E. Yerbury, M.Inst.C.E., on "The Electrolytic Action of Return Currents in Electric Tramways on Gas and Water Mains, and the Best Means of Providing against Electrical Disturbances."

PERSONAL.

The workmen and staff of the Bath Gas Company have presented Mr. C. STAFFORD ELLERY, who has lately relinquished the position of Engineer, with a grandfather's clock in testimony of their regard for him.

Hearty congratulations are extended to Dr. George A. Jeffery, J.P., and Mrs. Jeffery, who last Sunday celebrated their Golden Wedding. It will be recalled that a few weeks ago [*ante*, p. 99] the completion by Dr. Jeffery of his ninetieth year was recorded. He has been Chairman of the Eastbourne Gas Company for considerably over fifty years.

Mr. JAMES TAYLOR, the Gas Engineer and Manager of the Mossley Corporation, has been selected to fill the position of Engineer of the Weston-super-Mare Gas Company, for which applications were invited in the "JOURNAL" a few weeks since. Mr. Taylor's business career commenced in the chief offices of the Oldham Corporation Gas Department, where he obtained drawing office and laboratory experience. He was subsequently appointed Works Manager at the Hollinwood station, and superintended extensive additions of plant designed by the Chief Engineer (Mr. T. Duxbury). These included carburetted water-gas plant, regenerative retort-settings of a capacity of 2 million cubic feet per day, equipped with stoking machinery and coal and coke handling plant, new purifiers, boilers, exhausters, &c. He was appointed to Mossley in 1908, and has had to deal with extensive enlargements of distributing plant, including 2½ miles of high-pressure main, with compressing plant, governors, &c., now dealing with a maximum of 25,000 cubic feet of gas per hour. He has erected a new boiler-house, stores, show-room, and laboratory, to his own designs and under his superintendence; and last year he installed coal-handling plant, electrically operated stoking machinery, and coke breaking, screening, and storing plant. Since he has been at Mossley the annual output of gas has increased from 126 to 167 million cubic feet.

OBITUARY.

In the "JOURNAL" last week the death was recorded of Mr. René James Tahourdin, a well-known Parliamentary Agent. On the day the announcement was made in our columns, Mr. WALTER M. BELL, another member of the profession, died suddenly in his fifty-ninth year.

The "Journal für Gasbeleuchtung" reports that the death occurred on Jan. 25 of Herr ADOLF GEYER, formerly Manager of the gas-works at Gmünd, in Swabia. Deceased, who succumbed to an attack of influenza, was one of the earlier generation of gas managers, and had reached a very advanced age.

The funeral of Mr. W. H. OWEN, late Works Superintendent of the Hornsey Gas Company, who died at the Middlesex Hospital on Tuesday, the 9th inst., took place at the Finchley Cemetery on Monday last week, amid every manifestation of sympathy. The numerous floral tributes (including wreaths from the Chairman and Directors, the Engineer and General Manager, and the different departments of the Company) testified to the great esteem in which he was held by all. At the graveside, there was a large gathering of the staff and employees, who came to pay their last respects. Previous to going to Hornsey, Mr. Owen held a similar position at the Devonport Corporation Gas-Works.

Major J. MEAD, the Chairman of the Falmouth Gas Company, died at his residence in the town last Friday, in his 74th year. He was closely identified with the commercial life of Falmouth and Cornwall in general, and was on the directorate of several companies in addition to the Gas Company, and held large interests in mining and shipping enterprises, as well as being the proprietor of a newspaper and the owner of a local ferry and oyster fisheries. For many years he was a member of the Town Council, and was an active volunteer, in which he attained the rank of Major. In spite of his many activities he found time to devote a great deal of attention to the interests of the Gas Company, and its favourable position was due in no small degree to the encouragement he gave to a liberal and advanced policy.

DEATH OF MR. THOMAS S. CLAPHAM.

THERE will, we are sure, be a feeling of sincere regret among a very large number of gas engineers and managers at learning of the tragically sudden death yesterday week at the age of sixty-six, of Mr. Thomas S. Clapham, a Director and Secretary of the well-known firm of Clapham Bros., Limited, of Keighley. Mr. Clapham was attending the annual meeting of the Victoria Hospital Workpeople's Collection Committee, and was congratulating the Committee on the great enthusiasm they had manifested in their work, when he suddenly collapsed. He was at once removed on an ambulance carriage to an adjoining room, and a doctor was telephoned for; but, on arrival, he could only pronounce life extinct. The announcement of Mr. Clapham's death caused a painful impression among those present at the meeting. He had complained of feeling unwell on the previous Saturday; and though not fully recovered from his indisposition, he felt compelled, through his appreciation of the excellent work which was being done by the workpeople, to attend their meeting as a hospital representative, and give them what encouragement he could. For some twenty-seven years he had been a member of the Elective Committee of the Hospital; and it was a coincidence that he should pass away within the institution which he had watched rise from a small cottage hospital, with an annual income of about £650, to an up-to-date and well-equipped establishment with an income of more than £2000 a year.

Mr. T. S. Clapham was the eldest son of the late Mr. William Clapham, one of the founders of the Keighley firm. He began his business career with a six months' tour in the New World; and he had travelled much abroad at various times since—the firm's manufactures being in use in gas-works all over the world. As "JOURNAL" readers are aware, they made a speciality of washing and purifying plant. Mr. Clapham took out a patent on Nov. 14, 1900, for gas-purifiers, having reference to the construction of the movable covers, so that when they were placed in position perfectly gas-tight joints were formed, while their removal and readjustment could be more easily effected. This was the firm's "New Century" cover, and it was described and illustrated in the "JOURNAL" for Nov. 26, 1901. Their "Eclipse" rubber joint and holding-down apparatus were shown in the issue for Nov. 1, 1904. In conjunction with Mr. S. B. Clapham, he took out a patent towards the close of 1902 for a hydraulic centre-valve for gas-purifiers, which was specially applicable for use in connection with a series of purifiers worked in any order—the ingress and egress of gas being regulated merely by the filling and emptying of cavities with liquids to form seals to lock the passages or empty and leave them open as desired. The whole sequence of actions or alterations was carried out by the attendant regulating the inlet and outlet valves. Early in 1911, Mr. Clapham patented on his own account some joint-forming devices for purifier covers, which enabled a gas-tight joint to be produced without necessitating the exercise of the care previously required.

The value of dry joints for purifiers was emphasized on the occasion of the deplorable fatal accident at the Saltley Gas-Works, Birmingham, in October, 1904, caused by the blowing of the purifier lutes in one section of the works. In the issue of the "JOURNAL" for the 25th of October, Mr. Henry Green, of Preston, gave illustrated particulars of a device by which he had converted his water-lutes into dry joints, with resulting greatly reduced risk and anxiety to his men. In the succeeding number, Messrs. Clapham gave two sketches, with a description, showing the way they proposed to make the change; and early in 1906 Mr. Clapham contributed to the "JOURNAL" an article dealing fully with the subject. He showed how a 20 feet square water-lute box was converted into a dry-lute purifier, and gave a diagram of a section of a water-lute purifier fitted with "Eclipse" rubber joint and rapid automatic fasteners. Mr. Clapham acknowledged that Mr. Green was the pioneer of the dry lute principle; and he said that those who had followed in his wake were satisfied if their efforts, by pen or production, had in any way assisted to complete the idea he conceived.

Mr. Clapham was one of the founders of the Society of British Gas Industries, and was a member of the Provisional Committee in 1905, and of the Council from 1906 till his death. He was Vice-Chairman in 1911, and Chairman the following year. At the March meeting that year he read an excellent paper on "Industrial Unrest: Causes and Remedies," which, as we remarked at the time, showed a breadth of inquiry and thought that evinced a desire to get into touch with the real causes of the greatest of a nation's internal disorders, and, having found them, to see what remedies could be applied. The paper gave rise to a good discussion, and the author was cordially thanked for it. Mr. Clapham was one of the representatives of the gas industry on the Advisory Committee in connection with the Livesey Chair at the University of Leeds.

In connection with local institutions Mr. Clapham took a conspicuous part. During the last six years of the 'eighties he served upon the old Keighley School Board, and from 1897 to 1900 he represented the Central Ward as a Liberal on the Town Council. In 1911 he was President of the Keighley Chamber of Commerce, having been a member of this body from its formation in 1886; and on more than one occasion he had represented the Chamber at the annual meetings of the Associated Chambers. In his duties as President, he brought to bear long business experience and intimate knowledge of public work in various directions.

The funeral took place on Thursday afternoon at the Keighley Cemetery, and was largely attended by representatives of public bodies and business and personal friends. It was preceded by a service at the Albert Street Baptist Chapel, of which at one time deceased was a deacon and a superintendent of the Sunday School. Among those attending the funeral in a representative capacity was Mr. J. W. Broadhead, of Elland, the Chairman of the Society of British Gas Industries.

We learn from the Secretary of the Southern District Association of Gas Engineers and Managers (Mr. H. C. Head, of Winchester) that the March meeting of the Association will be held at the Hotel Cecil at 2.30 p.m. on the 11th prox. After the meeting afternoon tea will be served; but the Committee have decided that, owing to the war, it is not desirable to hold the annual dinner this year.

THE GAS INDUSTRY AND THE WAR.

The employees of the South Metropolitan Gas Company have received substantial evidence of the Company's interest in them, as indicated by the following notice headed "War Bonus:" "In order to meet to some extent the increased cost of living, it has been decided to adopt the principle followed by Government in the case of the railways, and to pay a special war bonus to all weekly employees until the declaration of peace. As in the case of the railways, the bonus will be at the rate of 3s. per week for men receiving 30s. or under per six-day week, and 2s. per week for those receiving over 30s. per six-day week. The 30s. will be reckoned after the deduction for sick and unemployment insurance, superannuation, and accident funds. Lads under 18 years of age will receive 2s. weekly."

Something of the same kind has also been done by the Plymouth and Stonehouse Gas Company, whose Directors last week gave proof of their interest in the workpeople by a voluntary advance of wages all round. This step has been taken, as the official announcement says, in consequence of the rise in food prices, and is intended to apply only during the war. The increases are: For boys under 18 years of age, 1s. per week; unmarried men, 1s. 6d.; and married men, 2s. In all, the Company employ about 400 men and boys. The news came as a pleasant surprise to the staff; and on Friday a meeting of the workmen was held to express their acknowledgment of the Company's thoughtfulness of them. One of the foremen presided; and it was decided, on the motion of two of the older employees, to send a letter to the Directors thanking them for "the kindly thought which prompted the spontaneous and generous action."

The Commercial Gas Company have advised the West Ham Corporation that they propose to make an allowance at the rate of 16s. per lamp per annum in respect of gas not consumed in public lamps which have been put out of lighting at the suggestion of the Government authorities. The Gas Light and Coke Company have informed the Corporation of their intention to make a rebate of £132 18s. 4d. in respect of the December quarter's account.

The Bermondsey Borough Council have decided to support the appeal to the Government to fix a minimum freightage for coal, and have called upon their representatives in the House of Commons to use their influence in this direction. Attention was again drawn at the Council meeting on Friday to the lighting of the streets. Mr. Layman said that Bermondsey was one of the worst-lighted boroughs in the Metropolis. The Chief Commissioner of Police had not ordered that the borough should not be better lighted than it was; and he thought the Council's officials should act without applying to the police. The Mayor pointed out that some of the street-lights had been turned out by the police. Mr. Delderfield maintained that the orders of the police and the War Office had been interpreted unreasonably by the Council's officials. There had been many street accidents of which nothing had been heard. It was, however, decided to leave the matter in the hands of the officials.

The Hampton District Council have received a letter from the Hampton Court Gas Company, enclosing an account for street lighting, amounting to £229 11s. 3d., being £270 1s. 3d. less 15 per cent., which the Company propose to allow the Council in respect of the non-lighting of certain of the lamps. At a meeting of the District Council, the Clerk, having reported upon the terms of the agreement with the Company, was instructed to inform them that the Council were not able to accept their proposed allowance of 15 per cent., and were only prepared to pay for such of the lamps as had been lighted.

Manchester and the surrounding district are now in possession of the terms of lighting arrangements which will come into force on the 1st prox. The regulations (which are given below) have been issued by Colonel H. D. Thorold, and are the outcome of conferences between the military and police authorities.

In all brightly-lighted streets and squares, and on bridges and elevated positions, a portion of the lights must be extinguished so as to break up all conspicuous groups or rows of lights. The remaining lights must be lowered or made invisible from above by shading them or painting over the tops and upper portions of the globes. While thick fog prevails, the normal lighting of the streets may be resumed.

Sky-signs, illuminated fronts or lettering, and lights of all descriptions for outside advertising or for the illumination of shop-fronts or buildings of any description, must be extinguished.

The intensity of the inside lighting of all buildings must be reduced.

In tall buildings which are illuminated at night, the greater part of the windows must be shrouded; but lights of moderate brightness may be left uncovered at irregular intervals.

Lights along the dock, river, canal, or water-front must be masked, to prevent as far as practicable the reflection of the light upon the water.

All large lighted roof areas must be covered over, or the lighting intensity reduced to a minimum.

The lighting of railway stations, sidings, and goods yards must be reduced to that sufficient for the safe conduct of business. The upper half of the globes of arc lights must be shaded or painted over.

The lights of tramcars and omnibuses must not be more than sufficient to enable the service to be conducted, and must be obscured when, and where, directed by the Military Authorities, or by the Chief Constable. Inside tramcars the lights must not be more than sufficient to enable the fares to be collected.

The grouping of flares of lights in streets or markets, or on the outside of buildings, is prohibited.

Powerful headlights on motor-cars or other vehicles are prohibited.

Red rear-lights must be carried by all vehicles, inclusive of bicycles, tricycles, delivery vans, and hand-propelled or hand-drawn waggons of every description when on a public highway.

In case of sudden emergency, all instructions given by the Military Authorities, or by the Chief Constable, as to the further reduction or extinction of lights, must be immediately obeyed.

The order applies to the city and county of Manchester, and will be effective from one hour after sunset to one hour before sunrise. It is to remain in force from March 1 until revoked or varied by a competent Military Authority. A proclamation on similar lines is to be issued in regard to Salford, Ashton-under-Lyne, Oldham, and other boroughs in the immediate neighbourhood of Manchester.

With regard to the extinguishing and obscuring of lights in the Isle of Man, his Excellency the Lieutenant-Governor, as a Competent Military Authority, has issued an Order, under the Defence of the Realm (Consolidation) Regulations, 1914, directing that all lamps on promenades and piers in the island, except navigation beacons, shall be kept extinguished until further orders, and that all street-lamps shall be put out daily at 9 p.m. The Secretary of State has, under the same regulations, made an order prohibiting the use of powerful lights on motor or other vehicles in all places where the lighting of the streets has been reduced; and the police will observe that the Secretary of State's Order is complied with. The purpose of the order is to prevent the use of brilliant lights. It is not intended to interfere with the carrying of lights which are necessary for safe driving at ordinary speeds. The Lieutenant-Governor appeals to the residents of the island, whether in town or country, to assist the general object in view by obscuring all seaward lights which are used either within or outside a place of residence or business.

Paignton is taking the lighting restrictions in a very serious spirit. It has been decided not to light any of the public gas-lamps in the town. When the District Council met last week, some of the members were a little restive over the drastic nature of the decree, and a number of reasons were advanced for departing from it and allowing the lamps at certain spots considered more or less dangerous to be lighted. Other members, however, took the view that all ought to be treated alike, and that it should be a case of all or none. The Chairman was on the side of the latter party, and said that if they allowed lights in any part of the town there would be an outcry from other parts, and soon lights would be everywhere. All had to make sacrifices in war time, and everyone should be treated alike. If they did not light the lamps they would have no gas bill to pay. This apparently clenched the argument, for the Council consented to the total extinction of lights without further to do.

Replying to an inquiry at a meeting of the Richmond (Surrey) Corporation, Alderman Simpson, the Chairman of the Highways Committee, said that he was unable to give the number of darkened lamps in the Richmond Gas Company's area alone. There were, however, 962 lamps in the borough; and of these 400 were darkened. The discount allowed by the Company was 24 per cent., as against 27 per cent. allowed by the Brentford Company. Mr. Frost said he was not satisfied that the Richmond Company allowed enough, in comparison with the number of lamps darkened.

Interviewed on the subject of the Government dye scheme by a representative of the "Observer," Mr. Arthur H. Lymn, who has had excellent opportunities during the last ten years of closely studying German enterprise in this branch of industry, pointed out the formidable nature of the task confronting this country. In summing-up his views he said: "In my view we have such a steep incline to climb that no other means than a tariff will be of any assistance; and I would recommend a scheme somewhat on the following lines: The imposition of a high import tariff for a period of five years. Then a reduction for the following period of five years. And at the end of the ten years, the tariff to disappear altogether, leaving the industry to take care of itself. . . . As at present proposed, the Government scheme is practically creating a monopoly in favour of a few existing concerns, whereas a tariff would enable anyone to take up the industry. Surely, it is not the desire of the Government to create monopolies."

The Central News states that at Charlottenburg it is intended to increase the price of gas. The same course will also be taken in Berlin, owing to the higher price of coal.

INSTITUTION OF GAS ENGINEERS.

Meeting of Council—The Southport Meeting this Year Abandoned.

A MEETING of the Council of the Institution of Gas Engineers was held at the Offices, No. 39, Victoria Street, Westminster, S.W., on Thursday last—the PRESIDENT (Mr. John Bond) in the chair.

BRITISH RED CROSS SOCIETY.

A communication was considered appealing for assistance on behalf of the British Red Cross Society. Having regard to the support which had been given to various war funds by members of the Institution locally, the Council did not feel justified in issuing a general appeal.

THE MEMBERSHIP ROLL.

Applications for membership were considered. The names of the following removed from the roll by death were announced; and a resolution of sympathy was passed with the bereaved:—

M. Adolphe Philibert Delahaye, of Paris, } Honorary
Mr. R. Forbes Carpenter, of London, } Members.
Mr. J. T. Byrom, late of Corbridge, }
Mr. Joseph Morris, of Jersey, } Members.
Mr. Gordon Walker, of Wantage, }

KELVIN MEMORIAL FUND.

It was reported by the Committee of the Kelvin Memorial Fund that the balance of about £450 was to be devoted to the establishment of a Kelvin Gold Medal, to be awarded triennially as a mark of distinction in engineering work or investigation of the kinds with which Lord Kelvin was especially identified. It is proposed to make the first award in 1916.

SOUTHPORT MEETING ABANDONED.

After consideration of the subject in all its bearings, it was decided, in view of circumstances connected with the war, to abandon the proposed annual meeting at Southport. It is proposed to hold a business meeting in London in June, when the various reports of the Council and Committees will be considered, but no papers will be taken. Under the circumstances, it was thought best to defer the election of Officers and Council until 1916; and those now holding office were asked to continue until such election.

THE CORBET WOODALL SCHOLARSHIP.

The report of the Corbet Woodall Scholarship Committee was presented, and the following statement referring thereto was adopted:

Corbet Woodall Scholarship in Gas Engineering.

The Institution of Gas Engineers have established a Scholarship bearing the name of Sir Corbet Woodall and tenable at the University of Leeds, of the annual value of £50, for three years, with power of extension for a fourth year on the recommendation of the Senate to the Corbet Woodall Scholarship Committee. The continuation of the Scholarship each year after the first will depend on the work done by the scholar in the previous year being reported to the Committee as satisfactory.

The Scholarship is intended to enable a student to take a course of study in "Gas Engineering" at the University, in preparation for a responsible position as a gas engineer. Candidates for election to the Scholarship are required: (i) To produce evidence of having reached a standard of scientific or technological education sufficient to enable them to take advantages of the B.Sc. degree, or diploma course in Gas Engineering, and (ii) to give an undertaking of their intention to follow the profession of a gas engineer. On each vacancy, the award of the Scholarship will be made during the month of June, after due advertisement in the Technical Press. The Scholarship will be awarded by the Senate after consultation with the Corbet Woodall Scholarship Committee.

Each candidate is required to submit (i) a statement of his previous education and of his scientific or technological qualifications; (ii) testimonials (*a*) from the head of the Institute in which he received his previous education, (*b*) if he has been already engaged in gas engineering works, from the engineer of the works. The Senate, in conjunction with the Corbet Woodall Scholarship Committee, will determine what examination (if any) is necessary in order to guide them in the award of the Scholarship.

THE LIFE OF GAS-METERS.

A Joint Committee of the Society of British Gas Industries and the Institution has been formed to consider the life of gas-meters, and the various conditions which may tend to shorten the same. Preliminary arrangements for conducting an investigation have been made.

REPORT OF THE FINANCE COMMITTEE.

The report of the Finance Committee, including the accounts for the year ended Dec. 31, 1914, were presented and adopted.

NATIONAL ILLUMINATION COMMITTEE.

The report was received of the Chairman (Mr. Edward Allen) of the National Illumination Committee of Great Britain, with which the Institution is identified, showing what had been done during the past year.

The Committee has had under consideration the question of the "Rating of Light Sources in Candle Power or Consumption," and has passed the following resolution, which has been transmitted to the Secretary of the International Commission on Illumination:—

> "It is desirable that a uniform international method be adopted for rating and marking all sources of light. It is recommended by the National Illumination Committee of Great Britain that the matter be considered at the next session of the International Commission on Illumination, and the administration of that Commission is asked to take the necessary steps to bring this resolution to the knowledge of the different National Committees with a view to their co-operation."

COAL SUPPLIES BY RAIL AND WATER.

The Emergency Committee reported having been in communication with the War Office, the Railway Executive Committee, and the Admiralty, with reference to the serious depletion of coal stocks and the difficulty of obtaining supplies both by rail and water. The authorities referred to had, as a result, promised to do what they could to relieve the situation. As difficulties still exist, efforts are being made to seek an interview with the Prime Minister, and to lay the matter before him.

SAN FRANCISCO EXHIBITION.

Mr. Edward Allen was appointed to represent the Institution at the Engineering Congress of the San Francisco Exhibition to be held in September next. It has been arranged that a paper from the Institution shall be presented at this congress.

RENOVATING GAS-MANTLES.

FROM early in the days of the gas-mantle, "inventors" have sought, by the application of some solution, when mantles are brought into use, to either strengthen the structure or intensify the illuminating power. But one after the other, these preparations have had their advent, and, then, after a brief struggle for existence, have disappeared. Nothing has yet come along that has been really effective; and if there was any known manner of producing by the mantle itself greater intensity of illuminating power and of strengthening the structure, means would be found for making the application during the process of manufacture, and not subsequently. The trend of things has been towards reducing the claims on the user for attention to incandescent burners and mantles; and we do not think that, unless there was some really substantial benefit to be derived, gas consumers would trouble much about treating the mantles.

After thinking that all such notions had finally perished, Messrs. Lang and Co., of Dalston, submit to us for trial a patented liquid to which they have given the trade name of "Lighto," and with which, it is proposed, mantles shall be sprayed. It is claimed that the solution cleans, strengthens, and increases the light-giving power of the mantles. It is acknowledged that the effect of the spraying is a depreciating one, inasmuch as it is recommended that there shall be re-spraying every three or four weeks; and, if this is done, it is declared the mantles will last at least twelve months. The solution consists of methylated spirit, powdered hydrocarbon, and salt; and it has to be well shaken before being applied. The hydrocarbon named in the patent is naphthalene. When the volatile character of methylated spirit is considered, as well as the effect of the application of heat to naphthalene, we can well understand that any (if any) good realizable from the use of the solution is of an evanescent character. We have made some comparative tests with sprayed and unsprayed high-class mantles of similar age; and there is regret that we do not find any appreciable difference in their lighting efficiency; although the observations have been continued over a full week. In the spraying, it was found that it was necessary to hold the spray some little distance from the mantle, in order to prevent puncturing the fabric by the impact of the spray. In spraying, too, there is a fair amount of waste of the solution. After the spraying, a light has to be applied; and with either type of burner—inverted or otherwise—there is a very unpleasant playing of flame around the metal work through the firing of the solution, some of which, it is unavoidable in completely spraying the mantle, falls upon the adjacent parts. We do not think, under these circumstances, that "Lighto" will ever become popular among gas consumers; and we are not persuaded, in these days of long-living and highly efficient inverted mantles, that there is any sufficient derivable benefit to justify troubling gas consumers with something which they would soon tire of applying.

Cost of Hydrogen Gas.—In the course of the report of the Comptroller and Auditor-General upon the Army Services appropriation account for the year ended March 31 last (which has been issued as a White Paper), it is stated, in connection with expenditure at the Royal Aircraft Factory, that the cost of hydrogen gas showed an increase from 19s. 2d. per 1000 cubic feet in 1912-13 to £1 1s. 7½d. in 1913-14. The output during the latter year was 2,023,607 cubic feet, as compared with 3,493,296 cubic feet in 1912-13.

THE METROPOLITAN GAS COMPANIES' ACCOUNTS.

For the Years 1912, 1913, and 1914.

	Year ended Dec. 31, 1912.		Year ended Dec. 31, 1913.		Year ended Dec. 31, 1914.	
	Totals.	Per 1000 C. Ft. of Gas Sold.	Totals.	Per 1000 C. Ft. of Gas Sold.	Totals.	Per 1000 C. Ft. of Gas Sold.
	£ s. d.	s. d.	£ s. d.	s. d.	£ s. d.	s. d.
Capital and borrowed money (including premium capital)	40,560,260 10 6	18 7·78	40,528,419 16 11	18 5·46	40,499,244 17 2	18 8·04
Income—viz.:						
Gas rental	5,082,241 15 9	2 4·04	5,131,567 17 1	2 4·04	5,162,960 4 4	2 4·56
Rental of meters	229,209 8 4	1·26	234,661 0 4	1·28	275,975 5 0	1·53
Rental of stoves, fittings, &c.	505,185 11 0	2·79	545,093 6 5	2·98	533,877 10 11	2·95
Residual products—						
Coke and breeze	1,183,118 6 0	6·53	1,312,622 1 4	7·17	961,848 6 8	5·32
Tar and tar products	263,265 9 11	1·45	317,894 16 0	1·74	272,788 8 3	1·51
Amm. liquor and sulphate of ammonia	421,683 14 5	2·33	412,020 12 1	2·25	334,702 15 6	1·85
Miscellaneous, including old materials	36,365 0 11	0·20	36,498 5 11	0·20	38,439 11 2	0·21
Total income from all sources	7,721,069 6 4	3 6·60	7,990,357 19 2	3 7·66	7,580,592 1 10	3 5·93
Expenditure—viz.:						
Coal and oil, including carriage and dues; also coke and breeze used for making carburetted water gas	2,451,164 17 9	1 1·52	2,868,497 19 5	1 3·67	2,781,602 18 11	1 3·39
Salaries of engineers and officers at works	71,102 1 3	0·39	73,059 5 10	0·40	75,806 4 0	0·42
Wages—manufacture	343,309 11 10	1·89	334,848 11 6	1·83	308,270 16 1	1·71
Purification	88,717 11 6	0·49	83,469 10 3	0·46	67,812 12 4	0·37
Wear and tear—manufacture	829,134 5 6	4·57	799,257 19 0	4·37	767,665 11 9	4·25
Salaries and wages—distribution	173,169 17 1	0·96	175,503 14 4	0·96	175,911 10 4	0·97
Repair and maintenance of mains and services	314,555 7 2	1·74	301,286 11 10	1·65	291,949 18 3	1·62
Repair and renewal of meters, stoves, &c.	708,170 13 9	3·91	697,418 5 9	3·81	678,368 13 6	3·76
Lighting and repairing public lamps	65,889 17 10	0·36	63,300 0 2	0·35	64,057 6 3	0·35
Rents, rates, and taxes	479,929 6 1	2·65	482,606 8 1	2·64	490,974 4 10	2·72
Salaries—management	30,014 3 8	0·17	29,592 0 1	0·16	29,790 12 7	0·16
Collectors' salaries and commission	96,496 15 11	0·53	96,618 3 2	0·53	98,282 1 3	0·54
Stationery, printing, and general charges	62,982 12 7	0·35	59,532 6 7	0·32	65,740 17 0	0·36
Directors and auditors	16,682 0 0	0 09	16,597 0 9	0·09	16,683 19 0	0·09
Co-partnership and profit-sharing schemes	97,507 15 11	0·54	105,948 0 4	0·58	96,203 10 5	0·53
Annuities to officers and workmen	110,360 13 4	0·61	86,790 18 9	0·47	87,002 18 6*	0·48
Contributions under National Insurance Act	7,171 8 3	0·04	15,010 18 11	0·08	14,962 10 10	0·08
Law and parliamentary charges	6,975 3 3	0·04	8,153 3 11	0·04	6,758 16 2	0·04
Bad debts and extraordinary expenses	23,882 19 1	0·13	22,806 14 6	0·12	24,772 3 7	0·14
Total expenditure on revenue account	5,977,217 1 9	2 8·98	6,320,297 13 2	2 10·53	6,142,617 5 7	2 9·98
Gross profit	1,743,852 4 7	9·62	1,670,060 6 0	9·13	1,437,974 16 3	7·95
Do. per cent. on capital and borrowed money	4 6 0	..	4 2 5	..	3 11 1	..
Do. do. gas-rental	34 6 3	..	32 11 0	..	27 17 1	..

* This item includes £7124 3s. 9d. allowed by the Gas Light and Coke Company to employees on active service, and £3207 18s. 3d. placed by the South Metropolitan Company to the employees' reservists fund.

ELECTRICITY SUPPLY MEMORANDA.

Animation among London Councils.

SINCE the advent of the London County Council Electricity Supply Bill (now withdrawn), the Borough Councils in the Metropolitan area have discovered that there is much that they have left undone which ought to be done, and that the condition of the demand for electricity—and in war time too!—necessitates the expenditure of much more capital with a view to extending the blessings of the supply, and increasing the capacity of the generating plants and distribution systems. Evidently the Bill has had an awakening influence. The result is the County Council, who have a sort of guardianship and veto over the expenditure of the Borough Councils in connection with their electricity undertakings, have been heavily pressed for money; and inasmuch as their Bill was nothing more than a Bill, they have—no doubt very reluctantly—had to give way to the applications of the Borough Councils under the existing statutory powers. Several of the latter have lately sought additional loans—among the more recent, Battersea, Hammersmith, and St. Pancras; and, in practically all cases, the Council have found they could not decently refuse what was asked for. In the case of St. Pancras, however, only part of the required loan has been allowed; and the reason given is that the Council's power to lend money to the Borough Authorities in the current financial year is nearly exhausted. This shows that there has been a big demand upon the Council by the boroughs; and yet nearly every sovereign spent has been up-against the Council's cherished policy of consolidation and co-ordination of the electricity supply systems. Another movement among the Borough Councils has been a sudden desire to obtain greater security by taking advantage of the dormant and neglected powers of several years' standing, to interlink their systems. What has produced this somewhat precipitate revulsion of feeling in favour of intercommunication one does not exactly know. The breakdowns of generating stations—more particularly the County Council's own generating-station feeding the tramways—may have had something to do with it. Or perhaps it has been the defunct or suspended County Council Bill; for it would have looked bad if the Borough Councils had gone before Parliament in opposition to the engulfing scheme without being able to show that they had done something to protect the public against cessation of supply by exercising the powers already possessed. Battersea is proposing to link-up with Fulham. Hackney is contemplating a working union with Poplar, for protective purposes and in the cause of economy. If this scheme goes through, Shoreditch, Stepney, Poplar, and Hackney will all be joined-up so as to be able to hold out a friendly and helping hand at any time. In addition to the security thus afforded, it would be possible for one station to run for the benefit of all from midnight to six o'clock in the morning—the hours of lightest load—and so produce mutual economy. If the Hackney Council decide to proceed, the Board of Trade will be approached with an agreement for ratification, under which the compact will have twenty years' run, with price revision at the end of every fifth year. It is wonderful what a menace to one's existence will do in causing the promotion of measures to avert the consummation.

Awkward Comments.

Mr. Andrew Gemmell is a gentlemen hailing from Ovingham-on-Tyne; and he is not over-enamoured of Mr. Merz's grandiose schemes. He is a shareholder in certain of them; and this explains the reason why he does not see eye to eye with the master mind on big electricity projects—such as the one drafted for London. The "Electrical Review" commented on Mr. Merz's lecture to the students of the Institution of Electrical Engineers, alluded to in the "Memoranda" last week. The writer of the editorial comments in our contemporary seemed to think that the interconnection of large adjoining areas for the purpose of supplying electricity is "essential to reliability, combined with economy." This statement caught the optics of the worthy Mr. Gemmell, who wrote to the "Review" pointing out that the "economy" of the policy could not be detected by the shareholders of the companies operating on the north-east coast with which Mr. Merz is closely identified. This is what Mr. Gemmell feelingly writes: "The commercial results, after eight years' working, of one of these groups of businesses are not a penny dividend to the ordinary shareholders *plus* £58,000 arrears of preference dividend, besides a loss of some hundreds of thousands written-off capital account in 1910." Then Mr. Gemmell slaps the writer in the "Review" by saying: "It is unfair to your readers that you should give an impression of successful development

that has not been achieved, so far as the north-east coast supply of electricity in the Cleveland and Durham area is concerned." We were remarking only last week, in connection with the London schemes and Mr. Merz's estimates, that it is a custom of electrical computation to go awry. Mr. Merz's estimates for London are supposed to be based upon his experience on the north-east coast, where the conditions have not the remotest similarity with those prevailing in London; and in the opinion of competent judges, there is not the slightest chance of these estimates being fulfilled. It is a pertinent point that Mr. Gemmell makes regarding those north-east coast experiences when he invites Mr. Merz to explain why the results of the Cleveland and Durham group of power companies have been so disastrous to the shareholders under the waste-heat scheme and the interconnection of large areas; and why the profits have been so very far short of those which were estimated to accrue without waste-heat. This is cruel, when the echoes of the cheers of those charmed students of the Institution of Electrical Engineers are still ringing in the ears of Mr. Merz, and before the *corpus* of the County Council Bill has had time to get thoroughly cold.

Normal Charges for Reduced Lighting.

The question of the charges to be made for reduced public electric lighting during the war continues to agitate the electricity suppliers of the Metropolis and the local authorities who patronize them for the illumination of some of their streets. The gas companies have made allowances for the smaller consumption of gas; but the electricity suppliers, with one accord, think that they should be paid their "full pound of flesh" under the contracts, on the grounds that it is no fault of theirs that there is restriction of the illumination, and that their expenses in respect of the lighting have not diminished in any way. It was recently seen that the electricity departments of London boroughs had been successfully wheedling their respective councils into paying them in full for the street lighting, in order that the revenue from the ratepayers might not suffer; and, indeed, some of them appear to want very badly all they can get, in view of the reduction of consumption by tradesmen. Not only the borough electricity departments, but the electricity supply companies are not disposed to make allowances. The Westminster Electric Supply Corporation, and the Charing Cross (West End and City) Electric Supply Companies are examples. The Works Committee of the Westminster City Council, having been made painfully aware of the smaller amount of illumination in the streets during some months of the last half year, ventured to write to the two Companies inquiring what concessions they were proposing to make to the Council. The replies were to the effect that the Companies were not proposing anything of the kind. The Westminster Electric Supply Corporation stated that the saving has been very small, and was far more than counterbalanced by the additional expenses incurred, for the following reasons: (1) The chief loss of light is due to painting the tops of lamp globes, which makes no difference to the quantity of electricity or carbons used. (2) Although 123 lamps are out of lighting, no current is saved, as this is absorbed in a resistance which is necessary to keep the other lamps of the series in lighting; the carbons only being saved. (3) The dimming of 224 lamps saves only 15 per cent. of current which would otherwise be used. (4) The ordinary expenses—*i.e.*, capital charges and maintenance—continue as before in all cases. As against the small saving, which would not amount to more than £100 by Dec. 31, the Company are paying a much higher rate for carbons. For the same number of days, the extra cost on this account amounts to £666; so that for the period they are £566 worse off as regards the street-lighting contract. The reason advanced by the Charing Cross Company for refusing any allowance is the simple one that the Order in Council has had the effect of seriously curtailing the lighting supplied by the Company; and, under the circumstances, they find it impossible to accede to a reduction in the charge for the public lighting. Moreover, the giving of any such reduction would probably mean similar reductions to persons supplied by the Company under similar contracts. Other people supplied with means of electric lighting under contract do not appear from this to stand any great chance of obtaining a rebate. However this may be, the Works Committee of the Westminster Council are wishful of being lenient to the Companies; but, while suggesting that the Companies shall not at present be pressed for allowances, they propose to continue to pay them something on account, without prejudice to the re-opening of the question of an allowance.

Lighting Changes at Woolwich Arsenal.

For the delicate work carried on in some factories, a steady light is highly essential, and if unsteady, it is trying to the eyes of the employees, and there is a loss of working efficiency. There are, it is stated, some changes proceeding in the lighting of parts of Woolwich Arsenal. Both high-pressure gas lights and electric arc lighting have been in use there; for the Arsenal boasts both a gas-works and an electricity generating plant. In certain situations, electric arc lamps are being superseded by high-pressure lamps, of which there has been such large and satisfactory experience. The principal reason for the change is that the vacillation of the arc lamps is something that it is an advantage to get rid of; and there is no need to tolerate the unsteadiness. There is an accompanying advantage in the change. It is that it releases a large amount of electric energy for driving machine tools; and at the Arsenal work is now being conducted at high pressure. There is another way the Arsenal authorities find they can rid themselves of the fluctuations of the arc lamps, and that is by the adoption of the so-styled half-watt lamps, which however have to be screened in order to protect the eyes of the operatives, and to obtain a good distribution of light. So screened, apart from any question of cost, a well-diffused and steady light can be obtained for the purposes of the particular classes of work conducted at the Arsenal. But the fact remains that high-pressure gas lighting is being extended in place of arc lighting.

Moulding Experience.

Many gas undertakings have for years taken an interest in the equipment of the cookery departments of Higher Elementary Schools; and in this direction some first-class work has been done, although, on the other hand, we have heard lecturers at County Council schools say that there are gas undertakings that take no interest whatever in the equipment used, and some of it is very old-fashioned. There is no doubt a considerable ultimate advantage to be gained from the tuition of girls in the proper use of gas-cooking appliances. The prospective benefits cannot, in fact, be over-rated. Mr. A. Nichols Moore, the Electrical Engineer of Newport, Mon., has come to this conclusion, as is shown by a letter to one of the electrical papers, in which he says that he has obtained the sanction of the education authorities to instal a complete outfit in the cooking department of the Higher Elementary School, where there is not only an excellent kitchen for the instruction of pupils, but also a laundry and other domestic departments where the senior pupils are instructed every day in the various domestic accomplishments. It is not proposed by Mr. Moore to confine himself to one type of apparatus; but from time to time, there will be change, and careful comparisons made. In this way, it is hoped to obtain data of real technical value. In the tail of the letter is the motive for the action. By these means, says Mr. Moore, "a very large number of young girls are being daily trained and brought up in the regular use of electric domestic apparatus. This, most obviously, will be of great advantage in the future by the spreading of general knowledge on the subject." We do not say that Mr. Moore has been prompted in what he is doing by what many gas undertakings did years since; but the fact that the idea is not new remains. Although gas undertakings were years ago looking after the training of young girls in the proper use of gas-cooking and other apparatus, they have no prescriptive right to the excellent procedure. However, gas managements may as well keep an eye on what their business competitors are doing for not only the present but the future, and act accordingly.

The Bad Case of the I.E.E.

It was never anticipated when the Institution of Electrical Engineers entered on possession of a home of their own that nothing would go right in connection with it. It seems to be an ill-fated place. Since the Institution took up their quarters there, the Council, according to their critics, captious and modest, have been incapable of doing anything right. Their inertia has been altogether beyond measurement; and when something actually new has branched-out from the deep furrows of an idolized custom—such as the much-discussed Industrial Committee—it has inevitably and speedily been wiped out of existence as possessing place among really useless things. Then we know what a large amount of trouble there has been over the lighting and ventilation of the lecture theatre. The very place where from the outset the pink of conditions ought to have existed in both respects is the one where there has been nothing but grumbling and disappointment. With all their wealth of electrical intellect, the Institution were not equal to providing a calculated illumination for the place nor a calculated degree of ventilation. What has happened therefore is that the place has been given over more or less to experiment, and to patchwork improvement. The theatre is the best of all testimonies to an incompetence to provide what was wanted from the outset; and if it could not be done in this theatre, then where could it be accomplished outside it? The grumbling has not ceased. The "Electrician" says that, when papers are being read or lectures delivered, one cannot fail to notice the hum of the motor generator. It is hoped the Council will find some way of "stopping the disturbing element." It is quite an easy matter to stop a motor generator. Our contemporary also thinks that there is a "general consensus" of opinion that the experimental lighting even now is not altogether satisfactory. The concealed lighting which was supposed to be the acme of perfection in regard to an anti-glare condition is now accused of imparting a distinct sense of glare; and this is probably becoming emphasized by the darkening of the wood panelling. With the view to overcoming this difficulty, experiments are being made in the top lighting. Two temporary pendants have been fixed—experimentally; and these are also charged with introducing a "certain amount" of glare. Consequently, the result is not so restful for the eyes. Fancy having exposed metallic filaments in the theatre of the Institution of Electrical Engineers! It is unpardonable. As it seems impossible for the Institution to avoid making muddles in regard to the illumination of the place, raising fresh complaint

every time fresh effort is made to realize improvement, a firm of gas-lighting experts should be consulted.

"Gossip" Perversion.

"Gossip" is generally reputed to be a lying jade. In the "Gossip" columns of "Electrical Industries," there is what is obviously a deliberate misrepresentation of some remarks recently made in the "JOURNAL." We were then speaking of the absurd view that our contemporary asserted was held in "progressive electrical undertakings," that "the line of action is based upon a conviction that electricity is destined to oust gas completely in lighting, cooking, heating, and industrial power." In the course of our comments, the remark was made that, "in any event, coal must be carbonized for the production of coke for various purposes, the production of tar for chemicals galore, dyes, disinfectants, requisites for ammunition, light oils, motor fuels, and much else, with the recovery of ammonia, and so forth." Our contemporary quotes these words, and adds: "Anyone who imagines that this [that is to say, the recovery of these valuable constituents of coal] ought to be done 'to enlarge the scope of the lower thermal value electricity' is pitied by our contemporary for his 'intelligence on economic questions.'" This is deliberate misrepresentation, and is unworthy a technical journalist. What we said was that, in carbonizing coal and procuring these constituents, gas must be produced; and the words that followed were: "Is the valuable heat energy of the gas to be wasted? We suppose the idea of those in charge of 'progressive' electrical undertakings is that it must be in order to enlarge the scope of the lower thermal value electricity. We pity their intelligence on economic questions." Those electrical engineers who are subscribers to the "JOURNAL" cannot surely approve of such an obvious perversion of our statements as that against which we here protest.

SOME LABOUR STATISTICS.

THERE is much information on a variety of subjects connected with labour to be found in the annual abstract of miscellaneous statistics issued by the Labour Department of the Board of Trade. The seventeenth volume of the series has lately been published; and it contains figures, in most cases, down to the end of 1913, though a small number of them are of later date. As some of the information appears in other volumes which are noticed from time to time in the pages of the "JOURNAL," it is not necessary to refer more than briefly to the statistics in their present form.

One of the sections deals with the time rates of wages and weekly hours of labour recognized in different trades at Oct. 1 last; the figures given being those which have been either quoted by the employers' associations and the trade unions concerned, or are embodied in working agreements. Engineering is one of the branches dealt with; the tables referring to pattern makers, iron moulders, turners, fitters, smiths, brass moulders, and brass finishers. In most instances the hours of labour stated are under 54 per week; in very few cases do they exceed it. For pattern makers, Manchester has the highest weekly figure for wages, at 43s.; while in several places 45s. to 45s. 6d. is paid to iron moulders. For smiths, wages go up to 41s. per week; and the same remark may be applied to brass moulders. For London, the rates of pay of pattern makers in engine and general shops are given as 10½d. to 1s. an hour; for iron moulders, 43s. a week; for turners, fitters, and smiths, 40s. and 40s. 6d.; and for brass finishers, 9d. per hour. The weekly hours vary from 48 to 54. A table showing the course of wages in the United Kingdom in the period from 1880 to 1913 demonstrates how substantial the advance has been in all the branches of work included. In 1912 and 1913, as compared with 1911, coal hewers' wages in all the fields showed big rises.

Particulars with regard to trades in which profit-sharing schemes have been adopted are given; the figures being those existing at June 30, 1914. The total number of concerns known to have adopted the system at that time was 328; but out of these 171 had abandoned it. The number of permanent employees engaged in these 152 businesses is calculated at 131,871, together with a small percentage of casual labour. Gas-works are far and away ahead of any of the industries included, in the matter of the number practising profit-sharing. The undertakings number 37; there having been only one case of abandonment recorded. They have 29,173 permanent and 2126 casual employees. It is interesting to note that the principle has also been employed in two electricity supply concerns. In the building trades, of twelve firms who adopted the system, ten have abandoned it; while in the mining and quarrying industries six out of seven undertakings have given it up; in the metal trades, eight out of nine. The cases of abandonment are classified according to the cause assigned for the failure of success of the system; and the largest number are to be found under "Apathy of employees and dissatisfaction of employers with results." This is the reason given in the case of the single gas undertaking which has had to register a failure. Other explanations in different cases were diminution of profits, enterprise abandoned, transfer of business, substitution of other benefits, dissatisfaction of employees, job finished, and special circumstances. The first scheme registered in the tables was in 1829; and this is among the abandoned ones. The percentage of bonus to the wages of the participants in 1913 varied from under 1 to over 20 per cent.; but the average bonus worked out in 1912 at 5·8 per cent. on wages, and in 1913 to 5·9 per cent.

The total number of persons receiving old-age pensions at March, 1913, was 967,921, or 637 per 1000 of the total population over 70 years of age, according to the census of 1911, and 21·4 per 1000 of the total population. Sections are also devoted to accidents, compensation payments, strikes and lock-outs, conciliation, cost of living, employment, and sundry other topics. At October, 1914, there were 1558 associations of employers; and of these 40 were in the mining and quarrying industries, and 496 in the building trades. Metal, engineering, and shipbuilding also accounted for 246. In 1899 there were 1310 trade unions having a membership of 1,860,913; and in 1913, whereas the number of unions had dropped to 1135 the membership had risen to 3,987,115. There were at the latter date 91 unions in the mining and quarrying industries, and 182 in the engineering and metal trades, while 79 were devoted to the affairs of employees of public authorities. In point of membership, the mining and quarrying group of unions were by far the strongest—consisting of no less than 915,734; those of the metal and other trades numbering 538,541 members. The 100 principal unions in 1912 had a membership of 2,000,102, and an income of £3,230,179, or £1 12s. 3d. a member; the expenditure being £3,823,277, or £1 18s. 2d. per member, and the funds at the end of the year £5,001,505, or £2 10s. per member.

The number of workpeople in the United Kingdom employed at all mines under the Coal Mines Regulation Acts, in 1913, was 1,127,890. A summary of persons in various occupations states that in 1911 there were 99,508 people employed in the gas, water, and sanitary service, of whom all but 143 were males. In the same year there were 54,488 Germans in the United Kingdom, and 107,323 persons from Russia (including Poland). The estimated population of the United Kingdom in 1914 was 46,407,037.

PNEUMATIC GAS LIGHTING.

THAT the pneumatic system of distance gas lighting has already been very extensively adopted, and goes on increasing in popularity, is, of course, a generally recognized fact; but even many people who are best aware of this will probably be surprised to find what a number of different patterns of valves for both lighting and heating purposes are supplied by the Pneumatic Gas Lighting Company, of 36, Farringdon Street, E.C. There are upright valves and inverted valves, for burners of all kinds, for both large and small lamps, and for single lights and clusters.

The extensive range of valves so far in use has been added to in several directions in a new catalogue which has just been issued by the Company. In the first case, to meet the requirements of those who do not care to stoop to light a gas-fire, or like to start it without leaving their bed, so as to have a warm room before getting up, there has been designed a special gas-fire set, consisting of switch, tubing, patent valve, and bye-pass provided with draught-proof shield. This convenient device can be fitted to any stove; and the valves are to be had in two sizes, brass or iron. Then, the inverted valve, which was illustrated and described some time ago in the pages of the "JOURNAL," has been made in a neater form, with a larger gas-way and a circular shutter; and there is also a newly patented high-pressure valve, of which particulars are promised shortly. Improvements have been made in the switches employed; and there are several fresh designs of pushes. Among the two pages of important installations to which reference is made in the catalogue are several cathedrals, and a large number of churches and chapels.

A special section of the list, it should be mentioned, is devoted to Neville's "Lift-Off" burner, which can now be had in five different patterns. Readers of the "JOURNAL" have already been made familiar with the principle on which this burner is designed; and it need only be remarked now that the different styles—the "Crown," the "Shell" swing and rigid, and the "Reflector" swing and rigid—are both attractive in appearance and substantial in make. The idea of the burners is that they may be instantaneously lifted off for cleaning, replacing mantles, or transferring to another fitting without breaking the mantle. The rigid patterns are intended for use with bye-passes, and the addition of pneumatic distance gas-lighters.

Municipal Gas Accounts for 1913-14.—We have received from Messrs. John Allan and Co. their "Analyses of Municipal Gas Accounts for 1913-14." The accounts of 78 municipal gas authorities are analyzed; all the items of revenue and expenditure being worked out at per 1000 cubic feet of gas sold. The makes range from 30 millions to upwards of 9800 millions per annum. Comparisons can be made of the gas produced and sold per ton of coal, of the residuals yielded, of the capital charges, and the capital employed in proportion to the volume of business done, &c. To allow of easy comparison of one account with another, cardboard rules, either in blank to allow of figures being filled in, or with the figures of any particular undertaking in the series printed upon them, are, as before, supplied with the "Analyses." The price of the work is 10s. 6d. net.

THE DISPOSAL OF COKE.—Part IV.

AND SOME MEANS FOR INCREASING ITS SALE.

By a Gas Engineer.

To increase coke sales, when once arrangements have been made to produce the various sizes required for the different uses, there is no end to the steps that can be taken.

Personal Canvass of Manufacturers.

If the district is an industrial one, an effective method is to send a suitable man of good address to call on all the manufacturers and other possible users of coke. Many of them will be found to be burning coal where coke would do the work more cheaply and efficiently and without making smoke. It is not difficult to persuade such people to try a ton of coke, and then to use one's knowledge of the article one is selling, firstly, to supply the correct size, and, secondly, to show the user how to burn it. If the knowledge is not forthcoming, the gas undertaking is handicapped; but even then experience will soon grow and show what is required in each individual case. Practical men of the right sort will quickly pick up the necessary information, and will in a few months become valuable representatives. It is obvious that the price must be right; and this can only be gauged by inspecting the coal already in use, ascertaining (if possible) its price and probable efficiency, and its comparative value with the coke to be offered. This being done, the value of coke to this particular customer can be judged, at least approximately. It need not be feared that such comparisons will show that coke must be sold at too low a price; for, as a matter of fact, owing to the indifference with which coke is sold by many gas undertakings, its actual intrinsic value as a fuel is rarely realized in £ *s. d.* Practical comparative tests in competition with coal, if the coke is burnt properly [which is rarely the case], with due regard to its characteristics, will disclose the fact that it is a high quality fuel—much higher than the makers usually realize.

Therefore comparisons of this sort can be entered upon with confidence and with excellent results. At the same time, the gas company or corporation must be willing to sacrifice something in the matter of price, which should be flexible, to obtain the *entrée* into manufacturers' works for purposes for which coal has hitherto been used. A broad view must be taken in this respect if valuable work in the direction of widening the local coke market is to be successful. The harvest will soon be reaped in the shape of a greatly increased demand, with the usual invariable result.

Calls should thus be made on every large and moderate user of fuel. The result should prove most satisfactory—largely depending, however, upon the quality of the man who has the work in hand. Such work can, of course, be carried out in conjunction with a general canvass for increased gas consumption, especially if the undertaking is not large enough to warrant a special canvass solely for coke. The point that the writer wishes to emphasize is the absolute necessity of not only pushing and advertising the sale of coke, but also of demonstrating to users the proper methods of burning it.

Increasing the Domestic Use of Coke.

To extend the use of coke in good class residential neighbourhoods, it is practically impossible to attempt to do anything in the direction of personal canvass and demonstrations. It is better to limit one's efforts to the distribution of literature of the right sort. describing the advantages of coke, the method of using it, and the most suitable type of household grate for burning it. Such literature can be distributed with the accounts, and will doubtless induce a certain proportion of householders to give it a trial, with satisfactory results in most cases—if the directions for using it are properly drawn up and carried out. It is suggested that the following leaflet will be suitable for distribution among domestic coke users, setting forth as it does the main principles which should be observed in burning broken coke in household grates.

Directions for Using Coke.

Coke will only burn well when broken into pieces of a suitable size, varying from a walnut to an egg in size.

The company sells broken coke at per cwt. above the price of unbroken coke, and strongly recommends its use for house fires of all kinds. If unbroken coke is preferred, the householder is advised to break it before use.

In using coke, the fire should always be laid in the usual way with coal and wood, and when it is well alight a start should be made with the coke.

Kitchen Fires and Coppers.

After lighting the fire in the usual way, broken coke alone can generally be used without any coal. If the draught is not good, a little coal may have to be used at times, if a great heat is required.

Bedroom and Sitting-room Fires.

Light the fire in the usual way with wood and coal, and then when well alight make up with broken coke, using some coal if the draught is poor. In using coke it is very important to keep up a thick fire from top to bottom. The thickness should be at least eight inches and more if possible. Coke will not burn in a thin layer like coal.

If these directions are carried out, broken coke can be used satisfactorily and with great economy—in fact, a good deal of money can be saved by burning coke instead of coal.

Remember that a scuttle of coke will cost less than half a scuttle of coal.

Gas undertakings have excellent and obvious opportunities of distributing literature among those consumers who cannot well be canvassed; and these should be taken advantage of on every possible occasion. A good method of bringing coke well to the fore was described by Mr. Boughton, of the Bradford Gas Department, in a paper entitled "Increasing the Sales of Domestic Coke," read before the Yorkshire Junior Gas Association. [See "Journal," Dec. 22, 1914, p. 672.] In this paper some excellent results were shown by sending out printed circular letters in typewritten characters to all householders, with a post-card order form enclosed. The letter contained references to the cheapness of coke, the necessity [in view of the inflated prices of coal] of choosing an alternative fuel, the intense heat given out by coke, and to the fact that, being smokeless, every citizen using it contributed towards the abolition of the smoke nuisance. Further, advice regarding its proper use, and particulars of prices, &c., were included. The letters, which numbered no less than 55,000, were delivered by hand by the meter inspectors. The result was extraordinarily good, and might well be repeated by other gas undertakings—to the very great advantage of the coke market throughout the country. Just at present there may be no particular need to increase the demand for coke. But slack times will come again; and there is no doubt that, when coal is very expensive, coke is given a thorough trial in thousands of households where otherwise it would never gain an *entrée*, which factor should prove of value in normal times.

The above method is obviously fairly expensive; but it is thorough, and there is no doubt at all that it is well worth the expenditure. There are certain methods of advertising which cost but a very modest amount, and for this reason they should certainly be adopted, though it cannot be said that they are sufficient in themselves to cause a wide demand. The following are examples: Enamelled plates on vehicles, posters on property owned by the undertaking, samples and particulars exhibited in showrooms, offices, &c., notifications on literature, leaflets enclosed in gas accounts and other communications, and handbills distributed by meter collectors. Then there are all the usual, but more expensive, means of advertising in directions which appeal to the householder, such as local newspapers and parish magazines, cinematograph films, programmes, hoardings, enamelled plates on railway stations, and tram and bus tickets. For such purposes the admirable productions of the British Commercial Gas Association relating to coke could not be improved upon; and advantage should be taken of their knowledge and experience. Advertisements of the sort mentioned are undoubtedly a most valuable means of causing a good demand for coke; but it is obvious that care must be taken to "deliver the goods," and not to give the customer any cause for dissatisfaction.

It is usual to demand cash with the order or on delivery; and there is a great deal to be said for insisting upon cash in all coke transactions with householders. At the same time, people who can be trusted to pay their accounts for gas can also be trusted to pay for coke. Further, there is some advantage in extending this convenience to customers, where the credit is good, for it undoubtedly tends to increase sales, and saves an appreciable number of returned orders owing to the absence of the mistress of the house when the delivery is made. It dispenses with the necessity of entrusting the carmen with a good deal of money, and simplifies book-keeping. Some undertakings have adopted this system with success, and it might well be extended with advantage. It must not be overlooked that a gas undertaking has exceptional facilities for gauging the credit of all possible customers in the district.

Commission on Coke Orders to Meter Collectors.

The above remarks refer only to ordinary consumers in good class residential property. For the prepayment meter and other small consumers, it is obviously impossible to do business other than for cash. To push coke among these people, there is no better means than the excellent method of giving the meter collectors a commission of (say) 5 per cent. on the value of all the orders they bring in. When it is considered that these men will visit as many as fifty houses a day, their opportunities for collecting coke orders as well as pennies from the meter will be seen to be immense. An energetic collector can quite well build-up a valuable clientèle among the (say) thousand coin-meter consumers whose money he collects. Orders are taken for any quantity, from 1 cwt. and upwards, and commission is limited to those orders actually given to the collector. Suitable leaflets are distributed to the collectors for their use; and in all cases broken coke only is recommended. On these leaflets the consumers are requested to give their orders to the collector; neither the address nor telephone number, but only the name, of the undertaking appearing. This gives the collector every opportunity of booking the order.

Paper Bag Sales.

A great deal of coke, especially in London, has been sold in brown-paper bags in 28-lb. lots. It is quite certain that no one would buy coke in this way except for convenience or for want of sufficient cash to buy 1 cwt. It is also quite certain that it is

impossible to deliver single 28-lb. bags to any given address in a district under 2d. or 3d. each—that is to say, at about the same price at which a 1-cwt. bag can be delivered. Assuming, therefore, that the coke is worth 2½d., the bag ½d., and delivery 2d., it is seen that the total cost is 5d., or twice the actual value of the coke. Besides, there is the extra cost entailed in loading the coke first into the bags and then into the van—a double handling on a very small unit. This is bound to be expensive when calculated at per ton or per cwt. This being so, this method of selling coke can, in the opinion of the writer, only be made a success if: (1) Deliveries of single bags are not attempted; (2) sales of single bags are only made at the works; (3) provided that the paper bags are sold in (say) 3 dozen lots to retailers, such as greengrocers, oil shops, &c., who can re-sell to the public; and also provided that (4) the labour in filling bags and loading the vans is done by boys, and (5) on a large scale. The work is light, and can well be done by boys; and by this means the cost of the coke loaded into van is little more than in the case of 1 cwt. sacks. Deliveries in 3 dozen lots to one premises should not cost much in excess of 2d. per cwt.; so that it is quite possible to sell them for re-sale at a price which will appeal to the retailer. The retailer is able to make a profit of 1d. per bag, and is enabled to deliver a paper bag of coke with other orders to his better class customers, or hand a bag over the counter with other purchases to the poorer class of customer. It is a system which has possibilities, apart from actual sales; for it is a splendid means of advertising coke. Who will not try a paper bag of coke? It is merely looked upon as a sample, which, if satisfactory, will lead to larger purchases on the next occasion. It is important to fill these bags with broken, and not large, coke; and, further, it is a very good plan to have the bags printed with "Directions for Using Coke," somewhat as follows:—

Directions for Using Coke.

Light the fire in all cases with wood and coal, then make up with coke.

For Kitcheners and Coppers.

Where a good draught is usually to be found, coke alone can be used with great success and economy—after the fire has once been lighted with wood and coal.

For Open Grates.

Coke, to which a little coal should be added makes the best and cheapest fuel.

Or, better still, the more complete directions, reproduced above, might be used with advantage.

Inquiries.

In dealing with inquiries it usually happens that there are several points upon which additional information is required before a quotation can safely be made. For instance, in delivering coke it is necessary to know the facilities for unloading a van, and whether delivery can be taken in bulk or in steam-waggons, if they are in use. In any case, it is very unwise to quote without inspecting the "shoot," as it is possible to be badly misled over such matters. Sometimes it is necessary for sacks to be carried up ladders and along narrow passages for a great distance; and in these cases the quotation should include sufficient to pay the cost of the extra work. So often inquiries do not specify the size and quantity of coke required, nor the period over which the supply is to extend. As there are also other and minor details which require some discussion, it is usually desirable to send a qualified representative to make the necessary inquiries, unless, of course, it only concerns an old customer who wishes to renew his contract. It is advisable to use a form on which all the queries are stated, and on which details can be given. This can conveniently be typed or printed in letter form to send out in cases where a representative does not call.

Quotations.

Too much care cannot be taken to safeguard the undertaking in the event of the market taking some decided upward or downward jump during the course of the contract. If the buyer has bought cheaply, his natural desire is to take delivery of the largest possible quantity, and *vice versâ*, in which latter case he will buy some portion of his requirements elsewhere, unless prevented by the terms of the contract. Again, the period over which the sale is made, and during which the quantity must be drawn, should always be stated. Otherwise, the arrangement can be prolonged, at the buyer's option, to an indefinite time, and delivery taken when the market has risen.

Thus some definite quantity should be specified on the contract note—somewhat as follows: 500 tons, and, if desired, some qualifying addition such as "10 per cent. more or less." "Total requirements, 200 to 250 tons." The quantity should not be left indefinite, as if the price was based upon an annual consumption of 100 tons, and the quantity was given as "total requirements," there would be nothing to prevent the customer from taking 2000 tons, should there be a rise in price. Many small coke users are large coal users, and if coal is difficult or expensive to procure, as at the present moment, customers will take every advantage of a coke contract. It is desirable to use the adjective "total" before the word "requirements," as this clearly means "all the coke that is burnt."

Contracts.

Some suitable form of contract note should be used, and it is suggested that any or all of the following clauses should be printed thereon:

1.—Supplies may be wholly or partly suspended during the whole or partial stoppage of work at the collieries from which coal supplies are drawn, or of the railways, vessels, or other means whereby the coal is transported to the vendor's works.

2.—Supplies may be wholly or partly suspended in the event of war, strikes, lock-outs, accidents of all kinds, or from frost, snow, flood, fog, or any other occurrence whatsoever beyond the control of the vendors.

3.—Suspended supplies arising from any of the above mentioned causes shall be delivered after the cause of stoppage has been removed at the contract rate of delivery; and this contract shall be extended to enable such suspended deliveries to be made.

4.—The vendors reserve the right to supply the purchasers from any of their works.

[For undertakings with more than one works.]

5.—No subcontract to be made on this sale.

6.—No complaint as to weight, quality, or quantity of the coke, or any part thereof, can be considered unless made at the time of delivery.

7.—Vendors to have the right to suspend or cancel this contract in the event of the purchasers failing to make the payments as above provided, or becoming bankrupt, or committing an act of bankruptcy; and if any such events shall happen all the sum of money owing shall at once become due for payment.

Clause No. 3 is usually worded differently in the case of dealers who reserve the right to cancel "any such undelivered quantity," while retaining the option to supply other fuel to the satisfaction of the buyer at current prices. In the case of an actual producer of coke, it would, however, be unduly arbitrary to make any such stipulation.

Clause No. 5 could not obviously be applicable in the case of sales to dealers. Merchants frequently stipulate that: "If after the date of the contract there shall be any increase or decrease in the railway charges for carriage affecting the coke sold under this contract, the contract price shall be increased or decreased proportionately," and in some cases this provision is extended to the rate of wages of workmen employed by the sellers in the execution of the contract, and to any duty or other charges which may, during the period of the contract, be levied under Act of Parliament or otherwise. Further, it is sometimes provided that, "Unless otherwise mutually agreed, sellers shall not be called upon to supply in any one month more than 10 per cent. in excess of the average monthly quantity."

Contract notes are usually divided into sections under the following headings: Quantity, period, description, delivery, price, payment, conditions; while underneath are printed the clauses already mentioned.

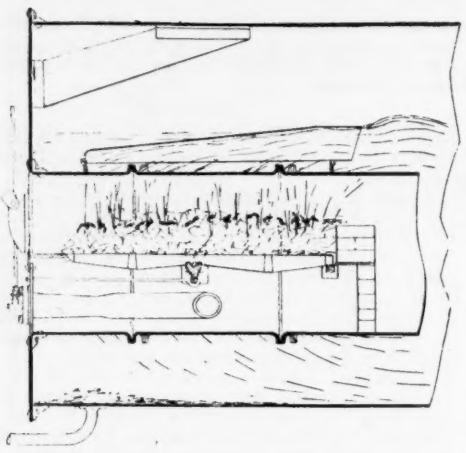
In quoting, too much care cannot be taken to ensure that important sentences, such as "This price is subject to alteration (without notice or by giving — days' notice)," "This offer is subject to acceptance within — days from this date," and the three words "until further notice" are not omitted in error, for such omissions will often cause no end of trouble. This is an argument in favour of standard forms of letters, which can be made to save a good deal of trouble and mistakes, enabling an intelligent clerk to do the bulk of the work with a minimum of supervision.

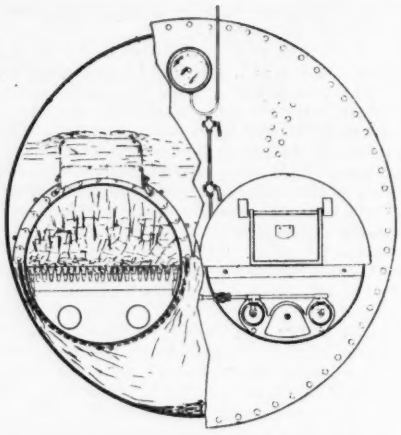
GAS COKE FOR STEAM-RAISING.

By E. W. L. Nicol.

With the rapid extension of the principle of coal carbonization, and the application of coke fuel to steam-raising plant, coke-ovens situated in close proximity to collieries and producing coke relatively low in ash content threaten to become a source of serious competition to gas coke, while the possible competition of peat coke is not so far distant as not to warrant consideration.

In addition to any change in carbonizing methods which may be adopted at gas-works, so as to make gas coke more suitable for domestic use, means to combat the threatened competition of oven coke in regard to purity may have to be considered. The limitations to selection of raw material would be the consequent advance in prices for gas coal low in ash content. Methods approximating to those adopted on coke-oven plants may therefore eventually become necessary, in order to secure to the gas industry an equitable return and a sufficient outlet for its most important bye-product. With the same object in view, the present might be an opportune time to consider what internal and external modifications are desirable in steam-raising plant, other than radical changes in design, to accommodate non-volatile solid fuel. Steam-boilers are invariably designed and rated (and





sometimes over-rated) on the assumption that natural coal fuel containing a full proportion of volatile combustible will be used; and, on hand-fired boilers (which will only be considered in the present article), more or less inadequate provisions are made to prevent the formation of smoke. These generally consist of means for admitting and mixing "secondary" air at the furnace door and bridge-wall, and, through lack of skilled attention and adjustment, generally tend to aggravate the inefficiency incidental to the use of raw coal under boilers. In the case of water-tube boilers, commodious combustion chambers, and various types of refractory ignition arches, are provided to promote the combustion of hydrocarbon gases as they are distilled off. Fire-grates restricted in area, and sloping downwards towards the back-end, are often provided with the same object in view; also "dead" plates at the front end for "coking" raw coal—a method which requires skill above that usually obtainable for its efficient use without constant supervision. For coke fuel containing little or no hydrocarbons, and consequently less liable to abuse and less difficult to deal with, all these provisions are not only unnecessary, but they militate directly against efficiency, and might with advantage be modified in exactly opposite directions. No secondary air is necessary, and an ample grate, sloping upwards, would tend to ensure the back-end, which is often quite invisible to the stoker, being properly cleaned and uniformly covered with fuel. As the effectiveness of radiant heat varies inversely as the square of the distance from its source, fire-grates for coke fuel might with advantage be raised within close proximity to the boiler tubes. Arches which shade the boiler heating-surfaces from the fire should be modified or removed. Unduly long and complicated flues and baffles might be shortened and simplified, with the object of increasing the draught over the fire and also the furnace temperature, which is more desirable than a low chimney temperature, as the rate of heat transmission to the steam and water inside is roughly in proportion to the square of the temperature $(T_2 - t_2)$. Fire-grates of the rocking and dumping types also tend to facilitate the use of coke fuel where long-continued periods of working at full load are necessary.

In boilers of the Lancashire type, the circulation of the water inside is known to be unsatisfactory even when long-flaming coal is used. With the adoption of coke fuel on this type of boiler this defect becomes more serious, as combustion is thereby localized to the fire-grate, and consequently the evaporation and steam generation are confined chiefly to heating surfaces situated immediately over or adjacent to the fire. This does not mean that the steaming capacity of the boiler will be seriously impaired, as in either case the amount of heat convected from the combustion gases is relatively insignificant. But to increase the normal maximum output with coke fuel, without the use of forced-draught, the application of one of the now well-known means to improved circulation is desirable, while a combination of the two would ensure a capacity beyond the normal maximum obtainable under natural draught conditions.

The sketch shows the fire-grate set in the most advantageous position for forced draught; and a "Marine" circulator adapted to a stationary boiler on the well-known Ross-Schofield system. It should be observed that the fire-brick bridge is only sufficiently high to prevent the fuel falling over the back-end, as the object of a high bridge disappears with the use of semi-volatile coal fuel. The steam-jet air-injectors shown are of different lengths; fairly uniform air distribution being thus secured.*

In districts where efforts are being made to develop an industrial market for coke, gas-works boilers fitted up on the lines indicated have been used with good effect to demonstrate to steam users its possibilities as cheap and efficient smokeless fuel.

In water-tube boiler-settings the fire-grate level might with advantage be raised considerably higher than is usual for coal fuel, thus reducing the cubical capacity of the combustion chamber and increasing the effectiveness of the radiant heat from the burning coke. The ratio of grate-area to heating surface is relatively higher in this type of boiler, and therefore the application of forced-draught becomes less necessary to obtain the normal capacity, though steam-jet or mechanically-impelled draught can be applied to individual boilers without great outlay, and considerable overload capacity thus obtained from coke fuel exclusively. Hand-firing tools for coal fuel require little or no modification for coke, with the exception of the firing-shovel, which should naturally be larger in size; a light-gauge No. 10 shovel measuring 17½ in. by 14½ in. is a useful size.

Steam waggon boilers invariably have a system of induced-draught fitted; the exhaust opening and funnel being so designed to form a steam-jet ejector on the same principle as that shown in the sketch. The increase in draught intensity necessary for the use of coke fuel in this case (when the grate area is usually extremely limited and incapable of extension) is obtained by slightly restricting the exhaust-cone opening; and the fire-grate, usually designed for friable Welsh coal and having only about 12 per cent. of air-space, may be opened-out to about 30 per cent. air-space for rubber-tyred vehicles and slightly less for steel tyres where the vibration transmitted to the fire-box is greater. With these slight modifications, the maximum legal speed and the capacity of the waggon are fully maintained on coke fuel. Waggons with boilers of the loco type so modified, and rated as "five tonners," are hauling loads of 12 tons on ordinary macadamized roads, when using coke fuel exclusively. Mechanical stokers successfully handling coke fuel will be dealt with in a separate article.

* The steam consumption of the jets has been ascertained by weighing the condensate from four ¾ inch jets working at 60 lbs. pressure, and was found to be 128 lbs. per hour, which is equivalent to about 10 to 12 lbs. of coke per hour.

Formaldehyde has proved an effective agent in preserving fruits in perfect colour and shape for exhibition purposes; and it is reported that at the Oklahoma Experiment Station pears have been kept perfectly for five years in a 2 per cent. formalin solution. For peaches and other very soft fruits, the solution is made of double strength, and about 5 per cent. of glycerine is added.

Society of Engineers' Lectures.—Following the practice established last year, of giving lectures to the members of student engineering societies affiliated to the Society of Engineers (Incorporated), Mr. Percy Griffith, M.Inst.C.E., a Vice-President of the Society, and Secretary of the Institution of Water Engineers, recently lectured before the Birmingham University Engineering Society on the subject of "Public Water Supplies." There was a large attendance of students, who evidently much appreciated the lecture. The Council have made arrangements for the delivery during the year of lectures to the members of other affiliated student societies.

Yorkshire Junior Gas Association.—The Association will hold a meeting next Saturday afternoon at the Leeds University, when Mr. John W. Lee will deliver his Presidential Address, entitled "Gleanings in Bye-Product Coke-Oven Practice," which will be illustrated by special apparatus and lantern slides. A feature of the proceedings will be a presentation to Mr. William Cranfield, in recognition of the valuable services rendered by him to the Association since its formation. At the foot of the notice of the Hon. Secretary (Mr. Edward Garsed) calling the meeting, appears this patriotic intimation: "Subscriptions are not required from members serving with the Colours."

Manchester District Institution of Gas Engineers.—The report of the Committee to be presented at next Saturday's annual meeting (the forty-fifth) points out that "the Institution continues in a satisfactory condition." The membership roll is now 200—showing a decrease of one on the year. There were five resignations; one has lapsed under rule 15; and the Committee "regret to record the death of their esteemed colleague, Mr. Thomas Newbigging, D.Sc., M.Inst.C.E., one of the founders of this District Institution, a Past-President, and for thirty-one years the Honorary Treasurer." They also regret to record the deaths of: Mr. John Chew, of Blackpool, a Past-President; Mr. S. S. Mellor, of Northwich, who rendered good service for twelve years as Honorary Secretary; Mr. William Severs, formerly of Wilmslow; and Mr. J. T. Byrom, of Corbridge. It is also formally intimated that Mr. James Braddock, of Radcliffe, also one of the founders of the Institution, was elected Honorary Treasurer.

EVENT AND COMMENT.

[Communicated.]

Development in Chemical Operations.

Development in the direction of including more in the nature of chemical operations is occupying the minds both of gas engineers and coke-oven people. The announcement that the Gas Light and Coke Company propose to go in for the manufacture of certain coal tar colours is very welcome, even only as an incentive to other large tar producers to extend the scope of their manufacturing operations. It cannot for a moment be admitted that there is anything Germans can do that we ourselves cannot do in this country. That we are sadly behind the Germans in many respects will not be denied at all; but the fact that we are behind should act as an incentive rather than a deterrent. In connection with bye-product coking, much of the development of modern systems has hitherto been entirely in German hands; but now British interests have come in, it behoves us to do what we can to foster these interests by encouraging suitable men to go in for the industry, and at least to make the hire worthy of the labourer. Not only is it desirable to attract the right class of men to the industry, but it is also necessary to provide proper facilities for the training of the men. The bye-product coking industry is now a very valuable one indeed, but the educational facilities provided in connection with it are limited. Students are not infrequently told that they can take advantage of courses of instruction which are provided for gas engineers. It must, however, be realized that there is a vast difference between gas engineering and coke-oven engineering, both in aims and in the methods adopted to attain the desired end. True, both carbonize coal; but in one case, gas is the principal objective—the coke and other residuals being more or less secondary considerations. In the other case, the production of coke is the most important point; but due regard must be paid to the bye-products, and of these gas is by far of the least importance. In many respects, coke-oven engineering is far ahead of gas engineering, especially in connection with the recovery of bye-products. The writer contends then that, in order to get the best out of the industry, better educational facilities should be provided.

Carbonization Topics.

Much valuable research work has been done in connection with the carbonization of coal; but, as far as this country is concerned, it has been almost entirely confined to gas-works conditions. Bulk carbonization as carried out in modern coke-ovens has not received the consideration it deserves, and many interesting problems await the investigator. The question of increasing the yields of the various bye-products without affecting the quality of the coke has received attention at the hands of gas engineers, and the writer has had to do with the repetition of some of these experiments under coke-oven conditions.

The liming of coal, as carried out at the Cheltenham Gas-Works, with the object of increasing the yield of ammonia and possibly decreasing the sulphur, was tried by the writer a short time ago. The coal carbonized in coke-ovens is washed slack, and usually contains not more than about 6 per cent. of ash, giving in the resulting coke less than 10 per cent. of ash. In order to make any appreciable difference in ammonia yield, it was found necessary to add at least 5 per cent. of lime. This increased the ash in the coke to an amount above that at which the buyers began to grumble; and for this reason alone the experiments had to be discontinued. One wonders, also, if ultimately the lime used would have had any effect on the brickwork of the ovens. It is generally agreed, the writer believes, that too much lime is a bad thing; but it invariably comes back to the question which brings such variable answers, How much is *too* much? With regard to the effect on the sulphur by using lime, this promised to be unsatisfactory also. From the gas engineers' point of view, one object of adding the lime is to reduce the sulphur compounds in the gas; the theory being that the lime will combine with some of the volatile sulphur compounds and retain them in the ash. The gas engineer is attempting to realize the ideal of a sulphur-free gas; and he is also desirous of bringing down his purifying costs as low as possible. By reducing the sulphur in the gas, his purifying material will last longer without any revivification, his boxes require less frequent changing, and hence his costs are down. As pointed out above, gas is the prime consideration. His coke does not matter much. But look at the matter from the coke-oven man's point of view. Apart from the increase in ash, his sulphur also increases; and this is about the most undesirable element existing from the iron and steel manufacturers' point of view. A slight rise in the amount of sulphur in metallurgical coke soon brings down wrath upon the head of the coke-oven manager. One cannot always be blaming the washery in matters of this kind; and coke buyers are notable fickle purchasers. The coke produced in the writer's experiments proved conclusively to be higher in sulphur than was normally the case. Additions of various other compounds to the coal have been suggested from time to time; but, as far as the writer is aware, none have been successfully adopted.

The carbonization of wet coal presents many interesting features. The part played by the moisture in the coal is not at all understood. It is known that it takes almost half the period of carbonization before the temperature of the centre of the charge rises above 100° C.—thus indicating that all the water has been evaporated. How does the water from the inner layers of coal leave the charge? Does it pass outwards towards the oven walls, or does it pass upwards through the centre of the charge through uncarbonized coal? If the former, then a kind of water-gas action goes on, and we shall have the steam being decomposed by the incandescent carbon and producing hydrogen and carbon monoxide. This being so, we should expect to find a higher percentage of these constituents in gas from wet coal than in gas from the same coal carbonized in the dry state. In the writer's experience, such increase has been observed, but only to a small extent; so that evidently much of the steam must escape undecomposed. This is further borne out by a comparison of the amounts of ammoniacal liquor obtained from wet and dry coal of the same class. So many factors, however, are operating at the same time over which we have no control, that it is difficult to come to a reliable conclusion in the matter. There is thus ample room for valuable work at the hands of some enthusiast who has the time, skill, and patience to carry it through.

Power Costs.

A very interesting paper was given recently before the Midland Institute of Mining, Civil, and Mechanical Engineers by Mr. W. B. Woodhouse, the Chief Engineer of the Yorkshire Electric Power Company, on "Power Costs." Mr. Woodhouse dealt with various phases of power production, and urged the important advantages of generating power on a large scale. In effect, he advocated the abolition of small individual power units and the development of the central power station idea; and he said that the low load factor on collieries meant low efficiency and correspondingly high costs. As noted in this column on Jan. 26 [p. 195], the Yorkshire Electric Power Company are working with collieries having surplus coke-oven gas, and, in return for the gas, supply the collieries with electric power. Mr. Woodhouse generally advocated a development of this idea from the point of view of cost. In the discussion which followed the paper, Mr. G. Blake Walker referred to the power plant at the Wharncliffe Silkstone Collieries, where they generated electric power and compressed air from coke-oven gas. The weekly running costs at Wharncliffe, for a plant of 1340 h.p. (1000 kw.) with a load factor of 65·4 per cent., worked out at £42 16s. 6d., or 0·093d. per unit. The up-keep accounted for 0·029d. per unit, the depreciation was 0·099d. per unit, making the total cost 0·221d. per unit. In this case the gas is used in gas-engines. With a steam turbine set, Mr. Walker made the cost to be 0·227d. per unit. Mr. Woodhouse pointed out that the load factor taken by Mr. Walker was very high indeed, and that 25 per cent. would be nearer for most collieries—thus more than doubling the cost. Coke-oven gas is, however, well worth attention from a power point of view; and whether a steam or a gas plant is adopted, a high load-factor and efficiency are necessary if it is to compete against the power station.

INSTITUTION OF MECHANICAL ENGINEERS.

Annual Report.

The report of the Council of this Institution for the year 1914 was presented at the annual general meeting last Friday. It showed that the total number of members on Dec. 31 last was 6400; being 54 more than at the close of 1913. There were 397 additions and 343 deductions during the year. The total revenue was £16,970, and the expenditure £15,521. The capital of the Institution amounts to £69,273. Mr. Charles Hawksley has transferred to the Institution debenture stock of the Lowestoft and Southend Water Companies, to form the capital of the Thomas Hawksley fund, and has sent a sum of £637 13s. 4d., representing the interest on these stocks from July 12, 1907, the centenary of the birth of his father. The fund has been put upon trust, which provides for the periodical delivery of the Thomas Hawksley Lecture, and the award of a Thomas Hawksley Gold Medal with or without a premium. The melancholy circumstances attending the delivery of the lecture last year, to which reference has been made in the "Journal," are recorded.

The first awards of the "Thomas Hawksley" Gold Medal, for the best papers published in the "Proceedings" of 1913 and 1914 respectively, have been made as follows: (1913) To Mr. Robert S. Whipple, for his paper on "Modern Methods of Measuring Temperature;" (1914) to Professeur Edouard Sauvage, for his paper on "Recent Development of Express Locomotives in France;" and to M. Anatole Mallet, for his paper on "Compound Articulated Locomotives."

The fourth award of the Water Arbitration Prize has been made to Professor A. H. Gibson, D.Sc., for his papers on "The Design of Volute Chambers and of Guide-Passages for Centrifugal Pumps," and "The Resistance to the Flow of Brine Solutions through Pipes." The fifth award will be made in February, 1917, for the best original paper dealing with any of the following subjects: "Methods of Purification of Water for Domestic or Trade Purposes," "Description of Hydraulic Machinery," "New Investigations in Hydraulics," New Developments in the Distribution of Water for Town's Supply or Irrigation," "Advances in the Utilization of Water Power."

THE DETERMINATION OF BENZOL IN GAS.

Below is an abstract translation of a paper on this subject (by Dr. A. Krieger) which appeared in the "Journal für Gasbeleuchtung" for the 6th inst. (p. 61). It is of special interest at the present time, in view of the steps now being taken in this country to extract toluene from the gas at gas-works as well as at coke-ovens. Trustworthy methods of estimating the content of benzene, toluene, &c., in the gas before and after treatment will be required to control the working of the recovery plant.

The Chemist's Committee of the Association of German Iron-masters reported that it was desirable that an exact method of determining benzol in gas should be worked out, since there was at present no such method available for the examination of coke-oven gas. Most of the methods hitherto described have applied to the coal gas of gas-works, which, it is well known, contains considerably more benzol than coke-oven gas. Moreover, the methods are more suitable for scientific than for works laboratories, where the greater part of the work is carried out by untrained men. Further, gas-works attach little importance to the continuous testing of the gas for benzol. The extension in the last decade of benzol recovery in coke-oven works has enhanced the importance of the problem. By benzol in this connection is understood the total of the compounds of this group, including benzene, toluene, xylene, &c.

Methods of benzol determination may be divided into two groups—those applicable to small quantities (viz., 100 c.c. to 10 litres of gas) and those applicable to 5 cubic feet or more. The method of inferring the benzol content from the specific gravity of the gas is included in the first group. It presupposes that the gas has a definite composition, and in any case is in practice more tedious than other methods of working. Another method which requires little gas is the absorptiometric method of Dennis and O'Neill, which has been improved by Ellen S. M'Carthy. Nickel nitrate, or nickel cyanide, is used for absorbing the benzol; but the method is not very suitable for coke-oven works, partly because it depends on exact gas analysis, and partly because of the small proportion of benzol in coke-oven gas. For instance, the benzol in the crude gas from Westphalian coal corresponds with about 1 per cent. by volume, and in the extracted or washed gas to about 0·07 per cent. by volume. Using a measuring vessel of 100 c.c. capacity 1 per cent. on the benzol would correspond with 0·01 c.c. of benzol vapour, and with ordinary laboratory apparatus it is impossible to work closer than to 0·05 c.c. Thus the absorptiometric method would involve an error of at least 10 per cent. As an extraction of 90 per cent. of the total benzol is ordinarily guaranteed, it would be impossible to ascertain by such a method of analysis whether the guarantee was being properly fulfilled.

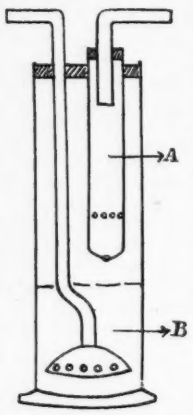
A similar method of working is that of Bunte and Haber, in which benzene and ethylene vapour are determined by means of bromine water. The ethylene is brominated, and benzene is soluble in the product of bromination. The ethylene is estimated from the consumption of bromine, which is ascertained by titration, and the benzene is found by difference. The method is quite good for coal gas from gas-works; but for coke-oven gas it does not give equally trustworthy results, since the heavy hydrocarbons do not total more than about 2·8 per cent.

The method of nitrating the benzene takes a middle position in regard to exactness. Harbeck and Lunge nitrate about 10 litres of gas and weigh the nitro-benzene after drying it at about 80° C. or over concentrated sulphuric acid. Losses are inevitable by this procedure, since nitro-benzene is readily volatile. If the drying is done in a vacuum the determination is too slow, and becomes of little value for works-control purposes. Pfeiffer nitrates in a separating funnel of about half-a-litre capacity, which volume, with washed gas from coke-ovens, would yield only 0·025 gramme of nitro-benzene, which is too small a quantity for exact work. Sainte-Claire Deville separates the benzene from about one cubic metre (35·3 cubic feet) of gas by cooling it to — 22° C. A disadvantage of this process is that the benzene is not completely extracted, as at this temperature 23·5 grammes of benzene remain in a cubic metre of gas. In crude coke-oven gas, however, about 4 grammes of benzene per cubic metre have to be determined, and in the washed gas still less. Owing to the tension of benzene vapour at — 22° C., and the difficulty of maintaining apparatus at that temperature for six to eight hours, this method is of comparatively little value. A method of a somewhat similar kind which has been proposed is to saturate the gas with benzene vapour by passing it through a saturator containing benzene, and from the quantity of liquid benzene taken up calculating the quantity of benzene vapour necessary for the saturation of the gas. Only ten litres of gas are used by this method, which is therefore not suitable for the work under consideration.

Müller has used a method of absorption with cooled paraffin oil which he has described in detail [see "Journal," Vol. LXXI., pp. 1318, 1384, 1472, 1575]. Nowicki modified the method by altering the form of absorption vessel in order to secure better contact of the gas and absorbent. The author has studied this method and introduced a modification of the apparatus, which extends its range of application and makes it suitable for coke-oven works. It is not necessary to use paraffin oil, as good results may be obtained with tar oil; but the freedom from colour of paraffin oil is in its favour. The author determined the quantity of benzene which was absorbed by 50 c.c. of oil in the washing flasks employed. He found that, when cooled to — 18° C., 50 c.c. of the following oils absorbed from gas the weight stated of benzene: Tar oil boiling between 170° to 205° C., 3·5 grammes; tar oil boiling between 240° to 270° C., 4·5 grammes; tar oil boiling between 260° to 340° C., 3·2 grammes; and paraffin oil boiling above 300° C., 4·6 grammes. In determinations, however, these limits of absorption should never be attained. In the author's investigations more than 0·8 gramme of benzene was never absorbed in the first flask.

A point of practical importance in regard to the washing oil is that an oil which of itself yields much light oil on distillation contaminates the benzol distillate and makes it difficult to work-up. This, of course, applies only to the first time of using the washing oil. The most suitable washing oil is one which yields at the most 10 per cent. of distillate below 200° C., and at least 90 per cent. of distillate below 300° C. The best tar oil for washing is actually one which distils between 240° and 260° C. Paraffin oil or petroleum distillates are too dear in Germany for employment as washing oils.

The author tried various forms of absorption apparatus, most of which allowed some of the oil to be carried forward by spurting or as spray. After many trials, he finally adopted the washing cylinder shown. This has a height of nearly 9 inches, and a diameter of 2 inches. It is charged with only 50 c.c. of the washing oil B. The outlet tube A, packed with glass beads about 1-12th inch in diameter, is about 6 inches long and ½ inch diameter inside. There is a small hole at the bottom of it, and rather more than ½-inch from the bottom is a ring of small holes which serve for the inflow of the gas. This tube is closed by a cork with glass outlet tube, which connects it with the next cylinder. In use, mechanically sprayed oil is completely retained in this outlet tube owing to the obstruction of the beads. Two absorption cylinders serve to absorb the benzol completely from gas, though in the author's investigations three cylinders charged with oil and one packed with cotton wool were used. The cylinder containing cotton wool was used for many months without showing perceptible alteration in weight. Hence for practical purposes it was found that the third cylinder charged with oil and the one packed with cotton wool could be dispensed with. The first cylinder ordinarily absorbed about 0·8 gramme of the benzol, and the second cylinder not more than 0·05 gramme.



With a view to securing further simplification, experiments were tried on working merely with cooling and without the use of paraffin oil, and on the use of paraffin oil without cooling. In the one case the empty cylinders were cooled in ice at a temperature of about —18° C., and it was found that only a small proportion of the benzol was extracted from the gas. Working with paraffin oil without cooling gave a rather higher extraction; but a long series of experiments showed that both absorption and cooling are necessary in order to ensure the exact determination of the benzol in gas in a simple manner. A balance weighing to 0·01 gramme on a load of 5 kilogrammes is sufficiently accurate for the purpose; and the determination may be carried out by any assistant capable of using the balance. In order to avoid errors due to the difference in weight of more or less air or gas in the cylinder, the air in it is displaced by dry gas before the first weighing; and after the absorption the cylinder is brought to the room temperature with one of its connections attached to a low-pressure gas supply and the other connection closed—a drying tube being interposed between the gas supply and the cylinder. The weighings before and after absorption are then comparable. About 40 litres of gas are passed through the apparatus per hour; hence when determining the benzol in gas which has passed through oil washers on the works the test extends over about eight hours.

It may be assumed that the process effects a determination of benzol in gas which is to all intents and purposes quantitative. When 5 litres of the washed and cooled gas were nitrated with a mixture of sulphuric and nitric acid there was no smell of nitro-benzene. Bauer has shown that 0·4 volume of benzol vapour in 10,000 volumes of air can be detected on nitrating by the smell of nitrobenzene.

An objection to the method of determination is that it involves the use of ice, which in some cases might be difficult to obtain. In these cases the laboratory should be provided with a small ice-making machine. The author refers to one which costs not more than £7 10s., and produces 2¼ lbs. of ice at one operation [2¼ lbs. of ice suffice for one determination of benzol in gas, though a machine of rather greater capacity would be more convenient]. The process, as described, makes it possible to determine benzol in quantities of only 2 grammes per cubic metre (874 grains per 1000 cubic feet) of gas. The method is sufficiently simple and convenient for use in the control of works; and as the recovery of benzene and its homologues (toluene, &c.) from gas is now becoming a matter of considerable importance, such a method of determination is likely to be of service in securing good results from the washing plant.

LIGHTING FITTINGS IN RELATION TO ARCHITECTURE AND DECORATION.

A paper was read at the meeting of the Illuminating Engineering Society last Tuesday, by Mr. F. W. THORPE, on the "Development and Design of Lighting Fixtures in Relation to Architecture and Interior Decoration."

The author glanced back to the lighting fittings of ancient and mediæval times and onward to the development of the gasalier and electrolier and other lights now possible, but impracticable in the past. The influence of ancient lamps on modern fixtures was discussed; and it was pointed out how the importance of the lighting fixture as a decorative object was largely recognized, culminating in the candelabra, which many people consider have not been excelled. As new illuminants appeared, the nature of these fixtures was influenced, yet in many cases the original forms were retained. When Twentieth Century illuminants are employed, the question arises whether some of these old models could be properly adapted to the new conditions. In an illustration thrown on the screen, it was seen how features in the outline design of ancient lamps have become incorporated in modern special designs of fittings. Then the author stated, without qualification, that the design of the lighting fixture has always been contingent upon architecture and decoration for its form of detail and ornament, though conventionalized natural forms were also used. Ecclesiastical lighting was also touched upon; and the author held that in the modern lighting of places of worship, this conservative treatment must be upheld, remembering the importance of tradition in Ecclesiastical Art. "Churches are designed on traditional lines, and probably the individuality of the architects. Modern improvements, such as lighting fixtures, should form an essential part of the scheme, and must be in harmony." Subsequently, dealing with domestic lighting, Mr. Thorpe laid it down that architects and designers, in endeavouring to preserve in their reproductions of various rooms the correct atmosphere and spirit of the period, required to be correct in regard to the gas and electric light fixture quite as much as in other details of furniture. But in a modern room possessing decorative qualities, if it is not the aim of the owner to be correct in detail, any type of lighting fixture can be employed so long as it is in good taste. There was a great deal that was historical in the first half of the paper. Coming to the second half, many problems of interest to architects, fixture designers, and lighting engineers were discussed.

VARIOUS PHASES OF INTERIOR LIGHTING.

It is difficult to lay down definite rules as to the method of lighting best adapted for various rooms. Every architect will have a different idea, and lighting requirements vary so much with the nature of the building—both in the amount of illumination and the effect desired. Care must be taken in the selection of the system, for we consider the relative efficiency of the direct, semi-indirect, and indirect principles, but often forget their relative decorative values. The fixtures should be considered in effect as well as efficiency. Generally speaking, a ball room demands an effect of gaiety, a dining room comfort, and a library an air of repose—all of which conditions may be secured by the judicious selection of fixtures, strength of illumination, and use of colour. Certain general requirements should be fulfilled, whether we are dealing with an old interior or a modern room. One of the most important of these is the choice of appropriate glassware or shades to go with the fixture. On entering a room lighted by artificial means the natural tendency is for the eye to travel involuntarily to the brightest object. One not infrequently finds good metal work in combination with unscreened lamps or mantles giving a glaring effect and hard shadows, such as are not desirable from a practical standpoint and are usually quite out of harmony with the æsthetic claims of the room. Broadly speaking, lighting that is inconvenient to the eye is also inartistic. In the past, artificial illuminants were invariably of low brilliancy. The candle and oil-flame had a brightness far less than that of the incandescent filaments and mantles of to-day, and the tendency of tradition is therefore towards soft and moderately bright effects.

The correct shading of artificial illuminants should therefore be considered in connection with fixture design. A fixture equipped with pleasantly shaped and coloured shades adds considerably to the decorative value of the room both by night and day. Fixtures are apt to be considered too exclusively from the standpoint of their appearance in daylight. At night-time, when they fulfil their useful function of illuminating the room, their appearance should also be pleasing. One may therefore lay stress on the importance of decorative silk and glassware in the scheme of lighting. There are instances in which the desire to be correct to period makes it impossible to use diffusing globes and bowls now becoming so common, but they certainly have an important *rôle* to fulfil.

Strictly speaking, the use of an electric lamp or incandescent mantle in an Adam or Tudor interior may be considered an incongruity. But the incongruity is lessened if the modernity of the source can be concealed. Thus candle fittings can be used with silk shades; and it is difficult to find a prettier effect. Modern illuminants can be used with antique lanterns if diffusing glass is employed to screen the lamps from view. The white glass bowls used occasionlly with Flemish features are admirable in this respect, since they can be used with any illuminant, electric, gas, acetylene, &c., concealing the source and giving a soft illumination of the semi-indirect type. By such methods various old models, where desirable, can be adapted to the requirements of modern illumination.

FIXTURES FOR PUBLIC LIGHTING.

Much that has been said applies both to domestic and public lighting, in which the author included the illumination of public buildings. But in the latter case the claims of good lighting from the decorative standpoint are particularly pressing. A fine public hall, a church, a museum—buildings that are frequented by the general public—deserve illumination in conformity with the architectural scheme. The lighting of such buildings is too frequently neglected. There is a tendency for the illumination to be considered at the last moment, when the building is almost complete, and the money set apart for its adornment is almost exhausted. Not infrequently the lighting is handed over to the contractor at the last moment; and he receives few instructions except those that have reference to economy.

To the architect it should be a matter for concern how the interior designed by him is lighted. Now the conditions are entirely different from those that prevailed in the past when artificial light was in a primitive condition, and the use and appearance of buildings by artificial light was not contemplated to any great extent. But in the present day there are many buildings where this condition is almost reversed. It is difficult to comprehend, when one remembers the care and thought expended in the adequate natural lighting of a building, why the artificial lighting should not always receive the same attention.

It is therefore essential not only that good and suitable fittings should be designed under the architect's supervision, but that these fixtures should be placed in the right positions and give the correct illumination. Upon this depends the whole success of his efforts as far as night time is concerned.

It is beyond the scope of this paper to deal with specific problems in lighting; but one type of building—the church—deserves special mention. There are those who consider that in churches of historic and national value, the atmosphere should be preserved by retaining old fixtures and illuminants. This is an arguable position; but, as a matter of fact, the introduction of modern illuminants, at first vigorously opposed, almost invariably comes to pass sooner or later. But it is curious to see that in many such cases the new illuminant, when it is introduced, is employed with little technical skill, and without any serious attempt to grapple with the complex problem of using new illuminants and fixtures in old surroundings. There are, perhaps, few problems in lighting that present such varied aspects. Besides considering the architecture, one has to bear in mind the practical points involved in the needs of the worshippers. Even in those cases in which the lighting has been considered with some care, one often finds a curious neglect of period. For example, while the lighting of Westminster Abbey may be good, the modern fixtures are not in keeping with the architecture.

Before leaving this part of the subject, a word or two may be said as to the part played by fixture design in exterior lighting. It is a remarkable fact that, while people will expend considerable care on the artistic side of interior lighting the possibilities of outdoor illumination have scarcely been considered. Lamp-posts are erected bearing no relation to the surrounding architecture. Now in the case of existing squares and streets which have grown up more or less chaotically, there may be difficulties in obtaining a coherent scheme. But in the planning of new streets and squares the lighting and the architectutal scheme should surely be planned simultaneously, so as to form one harmonious whole. There have been a few attempts to design special lamp-posts. Lamp-posts are often purchased by the borough engineer; it would be desirable for the designs to be first submitted to an architect.

There are also possibilities in the treatment of fixtures attached to the frontages of buildings, which should be designed to conform with the architecture.

INFLUENCE OF LIGHT AND COLOUR ON DECORATION.

It has already been pointed out that the fixture is an important part in the scheme of decoration. But besides this function the lighting unit has the effect of illuminating surrounding decorations and enabling them to be fully appreciated. The nature of these decorations should, therefore, have an influence in determining the scheme of lighting to be adopted. For example, if a hall has a very ornate ceiling and frieze, it is not a satisfactory plan, from the decorative standpoint, to use fixtures which concentrate nearly all the light downwards, leaving the ceiling and frieze in semi darkness.

The possibilities of colour have been neglected in modern fixture designs. The absence of colour is sometimes considered a drawback to indirect lighting for domestic use; semi-indirect and direct offer more scope by the simple use of coloured material to screen the light. The old-fashioned tent dining-room light would have been abandoned long ago were it not for the colour effects to be obtained.

MODERN DEVELOPMENTS.

Of late years a great deal of attention has been devoted to the design of fixtures with a view to the distribution of light in the most efficient manner, and in many cases entirely neglecting the artistic standpoint. It must be admitted that several types of fixtures designed on traditional lines, and perhaps based on old models,

are not particularly efficient as distributors of light. The metal work leaves little to be desired; but the arrangement of lights, shades, and reflectors is often inefficient. For the lighting of modern rooms the scientific as well as the artistic design of fixtures is of considerable importance, and the requisite distribution of light, together with the desired artistic qualities, can be obtained with these old models arranged to meet modern requirements. But it must be borne in mind that the concentration of the greater part of the light downwards by the direct method, which is rightly insisted upon from a utilitarian standpoint, may not always be desirable from an architectural standpoint. The distribution should vary according to the nature of the decorative surfaces to be illuminated; and, as we have seen, it is often limited by the necessity of faithfulness to period.

Use of Architectural Features in Illumination.

Finally, the use of indirect and semi-indirect lighting should have a distinct influence on ceiling decoration; and it is conceivable that such methods might give rise to an entirely new method of decorative art. In buildings lighted mainly by artificial means (theatres, for example) the design of the ceiling is often expressly adapted to artificial light. Domes have been constructed acting as reflectors; in other cases ceilings and columns of diffusing glass or alabaster have been built-in and lamps mounted behind them; and cornice-lighting has been applied in conjunction with decorative friezes. But these novel methods are not applicable to general practice.

DISCUSSION.

The Chairman (Mr. Frank Bailey), in inviting discussion, said the paper was most comprehensive and interesting, and he could not do better than leave it to both architects and designers for discussion, which he hoped would be just and critical.

Mr. John Darch (architect), opening the discussion, said, from the point of view of the fixture designer, Mr. Thorpe had given a masterly paper, which any architect would fully appreciate; but there were some other points of view in connection with the design of lighting fixtures to which attention should be drawn. One looked back with pleasure, if not with envy, at the creative minds of the past; but, living in a different age, the question that arose was whether true art did not demand that Twentieth Century light should have Twentieth Century fixtures. What was true art? Certainly not the slavish copying of the past. The beautiful art of former days was adapted to its own necessities. Some of them had seen the great candle hoops or coronas in old churches, or the great branching chandeliers in old baronial halls, with their tallow cups for grease; and they had seen them not copied, but caricatured, in modern buildings for use with gas and electricity. This unfortunate mania for copying was as inimical to progress as to true art. The manufacture of lighting agents was everywhere cheapening and improving; and the tendency was in the direction of higher illumination. Daylight was being emulated in its intensity, distribution, and colour; and quite right too. What, therefore, was the use of employing antique patterns, elegant enough in their proper place, but a bit incongruous and impracticable. There were doubtless many cases where they might be found suitable; but high-power lighting involved, or clearly should involve, an altogether different class of fixtures, or else no fixtures at all. He proceeded to plead for fitness—fitness for purpose, and fitness for place. In other words, utility and beauty should be conjoined. Utility should be the first consideration, and to this end one must know what he had to provide for, the purposes of the illumination, the intensity required at the working points, the nature of the distribution, the consideration of shadows, the care of people's eyes, &c., and then design the fixtures exactly to meet requirements. The artist now entered, in whose hands there were few utilitarian forms that could not be made attractive without piling on a redundancy of construction to make it look like something else. The whole history of art simply testified that it was possible to give grace to an article without superfluous ornament. "Beauty unadorned is adorned the best;" and this might be taken as an excellent motto for the designer of fixtures. Suitability was more pleasing than ornamentation; and practical success than either, for the mind needed to be satisfied as well as the eye. Leaving general principles, Mr. Darch proceeded to particularize. From among his illustrations, we may summarize his remarks regarding the lighting of churches. To the fixture designer, he said, churches might seem to be an easy subject, because of the prominence of ecclesiastical art in the past. In reality it was the most difficult—successful illumination being the exception. The reason was that the fixtures took precedence, and governed the illumination, instead of the illumination governing the fixtures. In days when mediæval patterns were designed, evening services were not the rule. Here to-day, they had those responsible for the lighting trying to fit a square peg into a round hole, with, naturally, disastrous failure. To see anything at all, the worshippers had to peer through a forest of low-placed lights in *quasi*-Gothic standards or pendants, or at least to endure the glare of lamps from a couple of brass pulpit-standards that, however handsome, one could not admire. The chancel might be beautifully decorated, but impossible to see, owing to the branched stall standards with their gleaming points of lights, while the upper half of the church was lost in heavy depressing gloom. Much of this was due to the lure of the fixtures. There was more anxiety to get something striking than to provide for the needs of the people. Architects were not always to blame. He had himself had trouble with building committees, who were afraid to depart from the conventionalities. The chancel might be easily and beautifully illuminated by concealed lighting, for which no fixtures, as such, would be necessary. For the body of the church, the fixtures would depend upon circumstances; but the people should not be punished by visible lights. The pulpit or even the low screen might have handsome standards, and if the lights were quite hidden, they could be properly admired. Natty little picture lighting fixtures might be designed for wall notices. The lighting of other public buildings came in for similar treatment by Mr. Darch; and views followed on the correct lighting of the rooms of dwelling-houses. In concluding, he said he must point out a serious impediment to progress, and that was the great fittings industry itself. There were hundreds of workshops and thousands of workmen making multiform variations of fittings on historic precedents. But shareholders cried out for dividends, and so stock patterns were turned out by thousands.

Mr. A. P. Trotter said the title of the paper reminded him of one disadvantage of modern lamps—gas or electric—and that was the use of the word "fixture." When he was young, they had the colza lamp brought in as required and afterwards taken out. Now they had to live constantly with their lighting fixtures, so that appearance became of importance. In many things, they had the law of supply and demand operating. They had the demand first, and the supply was provided. In artistic matters, the reverse took place. They should have the supply first; and, judging from what was seen, should be able to demand what they liked. Public opinion must be elevated and directed to the right lines. But to lay down the argument as to having things denuded of all ornamentation was quite outside the question. Personally, he would be sorry to see things denuded of ornamentation; but, as to what was best, every man must judge for himself, and suit his own taste. They could not in this matter lay down any laws or dogmas.

Mr. W. B. Warren (architect) said Mr. Thorpe seemed to suggest that architectural styles were consciously evolved, and that appliances for lighting were also quite consciously evolved, and akin to the architectural manner. He did not think this was the case; and it never could have been the case in the earlier styles of lighting. There was no adopted manner; the people then were not conscious of any accepted form whatever in regard to their lighting fixtures. The lighting contrivances were evolved from their practical needs—tempered by the craftsman's artistry, and shape by sheer fitness for practical purposes. Fitness of character to need in fittings was what they had to strive for. In designing fittings for gas or electric light, they should not adapt them to any particular style. It was a constant sorrow to him to find the tendency did not wane for cribbing dead men's ideas; and he asked, Were they not going to have the courage to evolve something for themselves? He was not inveighing against the designers of anything. He thought that architects were the greatest sinners. Incidentally he had a shot at the danger of the trailing flexible connections used with movable types of electric fittings, and spoke of the disaster that might result from their use. He protested against the idea that fittings should be in any way in subjection to the architectural style of the building in which they were to be put. The charm of old buildings was a succession of different kinds of manners and designs. There was no reason why fittings should be designed in any particular manner, nor why people should not have charm by contrast as well as charm by harmony. Contrast frequently gave a helpful effect. If the fitting put in was a good piece of craftsmanship, he did not think it mattered to what style it belonged. In this connection he put in a plea for common sense, and for crediting his profession with common sense. One later remark was that buildings should be planned with an eye to the artificial illumination required as well as daylight illumination.

Mr. W. D. Helps sent the following communication, which was read by Mr. J. S. Dow: It is an indisputable fact that the method of producing light from gas has, to a certain extent, influenced the design of fittings. The flat-flame burner, the first type used—and the nearest approach to burning the gas at the end of an open pipe, as was done when gas was first discovered—was, and is, in itself such an insignificant contrivance that it always looks out of balance with the best proportioned fittings. The upright argand burner which followed was a trifle more imposing in appearance; but it did not lend itself to a particularly artistic arrangement, owing to the length of glass chimney essential for its good working. The argand burner was then invented; and we had the regenerative lamp which, in some of its types where a Doulton-ware body was used, was more or less ornate but somewhat heavy. The introduction of the upright incandescent burner did very little to improve the fittings on which it was used; and the burner that has had the most effect upon the design of fittings is the inverted incandescent burner, now in general use. It lends itself to lines and schemes that were impossible with the upright types; and, owing to the fact that it could be made of very small dimensions, it will harmonize with fittings of much lighter construction. The fact that gas was first burned at the end of an open pipe, is probably the best indication of the causes of the slow progress made during (say) some 80 years, during which gas was used. The bulk of the fittings used during that period were the merest adaptations of the original method of burning gas; in the main very little initiative or ingenuity being displayed. Probably the introduction of the electric light had far more to do with the improvement in the design of gas-fittings than any other

single factor. The electric lamps could be used in any position, they were wind-proof, did not give off any great amount of heat, and the wires necessary for carrying the current were of the smallest dimensions. In the gas-fitting the bulk of the metal-work was looked upon as necessary for conveying the gas to the burners or for supporting shades or globes. With electric lighting, the metal work was considered more by way of ornament than of serving any useful purpose; and it is quite natural that, with the introduction of these lightly constructed electrical fittings, the designers of gas-fittings should in turn set about to see in what way they could reduce the weight of, and improve the appearance of, such fittings as are used for gas. The introduction of the inverted incandescent gas-burner gave them their great opportunity, as with the burners in a pendant position, they were able to introduce fittings closely resembling electric-light fittings in appearance. The public also had a hand in the matter, as they in turn demanded gas-fittings that were equal to the electric light fittings in appearance; and consequently designers with initiative were soon in demand. The result is that to-day gas-fittings are obtainable that do justice to any setting, and to fit practically any scheme of lighting that can be imagined. To some extent the waste heat from gas-burners was a source of trouble to designers of fittings, owing to the fact that it tended to discolour the high-class finishes. But this has been overcome in the design of the better-class burners, which emit the waste products in such directions that they do not affect the fittings. On the other hand, use has been made of the potential ventilating effect of this waste heat; and we now have exceedingly ornate fittings that are fixed directly on to the ceiling, and which, in addition to giving very even illumination, utilize the waste heat from the burning gas so as to create a powerful ventilating effect. These burners are now largely used in churches, public halls, large offices, &c., with very good effect. For indirect and semi-indirect lighting, electric light for some time held the field. The designers of gas-fittings, however, soon overcame the difficulties of adapting gas to this form of lighting. In those fittings where the bowl is suspended by chains from the ceiling, the gas supply is carried to the burner or burners, which are not visible from below, by means of a flexible metallic tube looped through the chain. Burners were designed that would lie snugly inside the bowl, and there are to-day numerous very artistic semi-indirect gas-pendants on the market. Some features in which progress comparatively recently has been made are the introduction of small upright incandescent burners forming imitation candles for use on period fittings, the use of silk and bead shades, the introduction of rise-and-fall pendants other than the old water-slide type, and the introduction of compact contrivances, which enable gas to be switched on and off exactly as is the case with electric lighting. The rate of progress during the last ten years has undoubtedly been much greater than at any other period in the world of science; and this fact, coupled with the introduction of electric light, is responsible for the great progress made of late in the gas industry.

Mr. P. J. Waldram (surveyor and civil engineer) thought that there was just as much need for scientific investigation in regard to this matter in connection with gas-fittings as with electric fittings. They should get electric fittings of fairly good design; but the majority of gas-fittings could only at present be obtained from the ironmonger. He thought there was greater scope for design in gas-fittings than in electric light fittings.

Mr. C. H. Burt (fittings manufacturer) remarked that most of the speakers had been inclined to say that the fittings manufacturer slavishly copied the existing methods and worked on hard-and-fast lines, and did not use his intelligence in designing new forms and new types. He protested against this. He did not think that, if fittings manufacturers designed fittings to their own ideas, they would be accepted by architects as forms that could be embodied in their decorative schemes. The fittings manufacturers must follow the practice of the architects. It must be well known to those who worked on the decorative side of lighting that the demand which now existed was for fittings of definite style; and, unless manufacturers could describe their fittings as belonging to a certain accepted classical style, he did not think they would continue to conduct a successful business. A celebrated Edinburgh architect once asked him (Mr. Burt) how he accounted for the fact that no one had succeeded in evolving a form of fitting which was so graceful and acceptable to the discriminating client as the candle fitting; and it was a fact that the most successful form of chandelier in use was that which had as its principal feature the artificial candle. He also asked the architects to remember that the maker of decorative fittings was handicapped by the practice of electrical engineers in respect of the higher voltages at which electric current was now supplied, compared with the early days of electric lighting. The existing pressures were not the ones the fittings manufacturer would choose, and which would be easiest for him to conform to. The difficulty had been still further increased by the over-brilliancy of the metallic filament lamp. They were now struggling with a source of light far too bright for decorative purposes. They were attempting to reduce these too powerful sources of lighting by dimming them; but the real problem was efficient diffusion. The length of the filaments of the metallic electric lamps was another disadvantage from the fittings makers' point of view.

Mr. J. G. Clark gave some illustrations on the screen of the lighting of churches and other public buildings by means of gas-fittings, and pointed out how, by the judicious use of upright and inverted burners, the architectural features could be seen better by night than by day.

Mr. Percy L. Marks (architect and surveyor) expressed appreciation of Mr. Thorpe's interesting paper. But this was not to say he by any means agreed with all the points in it; on some he should distinctly join issue with the author. He thought it a great mistake for any architect to profess that he was an expert on every point in connection with a building. It would be much better if he frankly recognized his main business, that of planning a building, and have recourse to the co-operation of experts in different branches so as to assist in producing complete perfection—whether in respect of ventilation or lighting or heating. They would get much better results, and please their clients much better, if they acted on the principle of co-operation. The question of lighting was so very empirical that it needed special study; and this rendered it more desirable that the architect should call in specialists to co-operate with him. This was not a mere theoretical principle, but one on which in practice he had acted.

Mr. Penn also advocated co-operation. This was an age of specialization; and it was not possible for them all to be perfect in so many phases of intricate subjects.

A hearty vote of thanks was passed to Mr. Thorpe, who is going to reply later to the discussion.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

A Lecture by Mr. W. R. Twigg.

There was a crowded audience at the Westminster Technical Institute, Vincent Square, S.W., on Friday evening, to hear a lecture on "Gas-Fire Hygiene," delivered by Mr. Walter R. Twigg, Technical Manager of the Davis Gas-Stove Company, Limited; and all present followed closely what he had to say. The lecture was accompanied by demonstrations of the "Shadowgraph" test, and lantern slides illustrating how gas-fires should not be constructed, as well as the lines on which they should be designed. Mr. J. Hewett, the President, occupied the chair.

The President, at the opening of the proceedings, made reference to the fact that Mr. W. J. Liberty (a Past-President) had joined the Naval Reserve Anti-Air Craft Corps, and wished him the best of health and luck in his new venture. He also stated that, in response to the letter written by the Hon. Secretary to Mr. T. F. Canning congratulating him on his appointment as Engineer to the Weymouth Gas Company, Mr. Canning had replied thanking them for their good wishes, and expressing the hope that in his new sphere of work he might be a credit to the Association, of which he was proud to be a member. The President then introduced Mr. Twigg, with the remark that he was one of the older members of the Association, to which he belonged at the time Mr. Grafton was President—some years ago now.

GAS-FIRE HYGIENE.

Mr. Twigg then proceeded to deliver his lecture, which he pointed out was the result of the visit paid a little while back by the members of the Association to the Davis Gas-Stove Company's works at Luton. When there, the visitors had expressed a desire to see a demonstration of the "Shadowgraph" test; but as time did not permit of this, the suggestion was made that he should attend one of their meetings for the purpose. Before proceeding with the demonstration, he felt it was absolutely imperative to go through a few preliminary inquiries with them.

Heating and ventilation, he continued, are subjects which become daily more closely associated. So much is this the case that I have found it quite necessary to become actively connected with the ventilating side of our business, so as to keep fully abreast of the subject. Now, what is the position of gas-fires in respect to ventilating? Until quite recently it has been—and I think I may say in a large number of cases it still is even to-day—our habit to consider whether or not ventilation is efficient purely and simply on the basis of the amount of carbon dioxide which is present in any sample of air which may be taken. The Factory Acts, and other Acts and official opinions, are still based on this question of carbon dioxide; but among the more advanced ventilating engineers the question of carbon dioxide and its effect on the efficiency or otherwise of the ventilating system has practically been relegated to the scrap-heap. We have frequently seen, and we are still to-day seeing in many cases, statements in the official world that it is not permissible to have more than 6 parts of carbon dioxide in 10,000 parts of air used; but if we have gas lighting at night, we are permitted to have more.

Investigations have been carried out by very many well-known people—people whose qualifications and work demand that their opinions should have careful consideration—and it has been conclusively shown that such limits are absolutely unnecessary and absurd. Of the prominent workers on this subject at the present day, I think the best-known one is Dr. Leonard Hill. I believe I may say it has been fully proved, or at least that there is evidence which justifies us in concluding, that carbon dioxide, even if present in air to the extent of 3 or 4 per cent., has no appreciable influence whatever on the value of the air for breathing. The air in our lungs normally contains a large percentage of carbon dioxide—approximating 5 per cent. On expiring air from

the lungs, we do not expel all that is there, but only some two-thirds, and we inspire air containing a low percentage of carbon dioxide. The result is that the air within our lungs always, under anything like normal conditions, contains an unvarying proportion of about 5 per cent. of carbon dioxide. If we unavoidably find ourselves suddenly in an atmosphere where there is more carbon dioxide than (say) 10 parts per 10,000 parts of air, Nature at once comes into play, and we immediately start breathing more deeply. We expel a large proportion of the air contained in the respiratory organs, and we inhale as a result more than the usual proportion of fresh air, and so maintain approximately 5 per cent. of carbon dioxide in our lungs. It is not until we come into air containing about 6 per cent. of carbon dioxide that natural adjustments fail, and the amount of carbon dioxide in the lungs becomes so great that it begins to get into the blood, and poisoning of a more or less dangerous form results.

It is found that it is not until we get up to between 5 and 6 per cent. that there is difficulty in keeping the carbon dioxide in the lungs down to the required extent. As the carbon dioxide mounts up higher in proportion, we first begin to feel lacking in energy. As the proportion increases, these symptoms become more noticeable; and finally the percentage gets so high that the blood becomes poisoned, and we are unable to continue to live in an atmosphere containing very large percentages of carbon dioxide. But it is practically unknown that we should reach even 1 per cent. in air we are likely to breathe; and I think it can safely be said that there is abundant evidence to show that we are not likely, except under most extraordinary conditions, to be brought into contact with carbon dioxide which, in itself, will have any appreciable detrimental influence upon our breathing and the generally healthy condition of our bodies.

There have been other reasons suggested as to why one air is healthy and comfortable and another air is said to be unhealthy and uncomfortable. It has been suggested that the cause of the latter state is not the rising percentage of carbon dioxide, but the falling percentage of oxygen—that any diminution in the percentage of oxygen in the air we breathe will be accompanied by detrimental and uncomfortable symptoms. Now, it is very exceptional indeed, in climates we are in the habit of living in, for the oxygen in the air to fall 1 per. cent. below the normal. There are towns situated at a very high elevation where the oxygen is as much as 1½ per cent. below what we call normal (somewhere in the region of 20 per cent. in the air). In such places, with 18·5 per cent., no trouble whatever is found in breathing. It is not until we have a very decided falling-off in the percentage of oxygen that we experience any breathing trouble. Getting down to some 14 per cent. of oxygen, trouble begins; and with 12 per cent. there is noticeable difficulty in breathing, and one does not feel particularly active. At 10 per cent. there is a perceptible change in the nature of the skin, accompanied by palpitation; if you go down as far as 6 per cent. consciousness is lost; and at 4 per cent. of oxygen you will apparently reach the lowest limit at which you can live. Of course, 4 per cent. of oxygen is a very small amount, and represents a state of affairs we are never likely to experience; and I think it has been indisputably shown by the work of Dr. Leonard Hill and his associates that any diminution of oxygen we are likely to experience cannot be stated to account for the undesirable effects of what we call bad ventilation.

We have had a number of other things suggested; and the one which has been pushed forward with the greatest amount of energy is, I think, the detrimental influence of the moisture we expire. When we breathe, we expel a certain amount of air containing a large percentage of moisture, as the result of internal combustion. There is practically a process of combustion going on within our body which demands that we should exhaust a certain amount of moisture. It has been suggested that this moisture contains poisonous substances; and that if one person breathes for long enough air expired by others, he will go home and die. I believe Brown-Sequard was the originator of this theory, which was the result of certain experiments he carried out. He took four animals, and placed them in cages so arranged that the air expired by the first animal passed to the second cage, and from the second to the third, and so to the fourth; and he found that in a short space of time the fourth animal died. He said it was because it had breathed air which had been expired by the other animals, and that this air contained poisonous compounds. Dr. Leonard Hill, however, has shown that it was no such thing. The fourth animal died, not because he was breathing expired air, but because he was breathing air containing more than 6 per cent. of carbon dioxide. Death was due to want of air-change. The air had been used up, and become vitiated beyond the limits within which the system can make the necessary adjustments.

Brown-Sequard also tried to support his theory in another way. He condensed exhaled air, and collected the moisture resulting; and he injected a certain quantity of this moisture beneath the skin of a mouse, which was made extremely ill. This seemed to have a lot of truth in it to support the theory; but when we come to consider that the weight of moisture injected was to the weight of the mouse as 1¼ gallons is to the weight of a human being, we can quite understand the mouse being ill. There have been no end of experiments conducted; and injections of exhaled moisture beneath the skin have been made with no detrimental results whatever. I have had doses injected into myself; and I think, if you take the trouble to study the work of Dr. Hill and others in this matter, you will find there is ample evidence to show that exhaled moisture from healthy subjects is not the cause of any bad effect in a crowded room. I do not suggest you should conclude that air exhaled from an unhealthy subject is free from poisonous matter; but from a healthy subject, there is no poisonous substance to be found in the exhaled moisture.

Having disposed of these theories and suggestions, we naturally say, "Well, you have taken away all our laws, our arguments, and our faith, what are you going to give us in exchange? You still leave us where we were. In fact, in a worse position, because we have now nothing whatever to go upon." I am not going to say for a moment that there is decisive evidence, but I think there is enough to lead us to the conclusion that the most important items are not questions of chemical purity, not the amount of carbon dioxide, not the percentage of oxygen, not the nature of the air we exhale (if we are healthy), that really governs good or bad ventilation, but that it is more a question of humidity and temperature. Our body may be looked upon as representing the wet bulb of a hygrometer. We are losing heat from our bodies by evaporation; and if we cause this loss of heat to go on too quickly or too slowly, we shall set up effects which will lead us to say that such and such a room is not pleasant to live in.

Take this full hall, in which you are sitting fairly close together. Supposing, as is probably the case, there is very little air movement between each of the individual members. The bodies are giving off moisture, and the air between you being more or less stagnant is rapidly becoming hot, and what is perhaps more important it is becoming saturated with moisture. What is the result? Your body has to get rid of the necessary amount of heat; and some of this heat has to be got rid of by evaporation from the skin surface. If the air becomes hot and saturated, you cease, if not entirely to a very great extent, to lose heat-conduction from your body to the air, and by evaporation from the surface of your body, which latter will not take place if the air immediately in contact with it is saturated.

This is another subject on which, I think, Dr. Leonard Hill is probably the greatest authority. He has demonstrated by experiment the importance of this point. He shut eight students up in a small chamber, where the air-change was strictly limited, and there was nothing whatever to promote movement of the air; and he left them there until the amount of oxygen present had gone down by some 3 or 4 per cent., and the wet-bulb temperature was as high as 85°, showing the air was approximating to saturation. The reduced amount of oxygen is, of course, accompanied by a corresponding rise in the percentage of carbon dioxide. Under these conditions, the students very rapidly became languid. They seemed to lose all their spirit, and had no "go" in them. They did not want to smoke; but even if they did, they were very much surprised to find that they could not, because it was impossible to strike a match. This was a state of affairs one would almost imagine one could not live in. When one of the students received through a tube air from without containing a normal percentage of oxygen and carbon dioxide, he experienced no relief whatever. It was not helping him to lose heat from his body. On the other hand, if a person standing outside in the free air, where the temperature and humidity were at a reasonable and desirable point, took some air from the chamber and breathed it through a tube, he in turn experienced no bad effects whatever. But if the air in the chamber was caused by suitable fans to be set in motion, the stagnation of the air which had prevented evaporation was removed, and relief was immediately felt. This, I know, is all perfectly true, because I have tried it myself. The relief is even more pronounced when, with the movement of the air, cold water is circulated—cooling the air and promoting loss of heat from the body by conduction.

This will, I hope to a considerable extent, bring home to you the importance of air movement and temperature and humidity—points which I am not going to enlarge upon at any length to-night. I have just run over them to give you the view which is taken of ventilation by some modern ventilating engineers, and a view with which I am much disposed to sympathize.

The next question I want to ask is, "What is the position of the gas-fire when regarded from this stand-point?" As long as we looked upon the carbon dioxide as the indication of good, bad, or indifferent ventilation, the position of the gas-fire was fairly well pronounced. We knew pretty well where we were. But its position is not quite so obvious when we take these later views. Particularly is this so if we take a broad view, and fail to analyze it. If we do analyze it, as we have very briefly done this evening, it perhaps helps to clear things up a little.

A gas-fire, if you permit the products of combustion to escape into the room, will add carbon dioxide to the air of it; but in doing so, unless the amount added is very great, it will not, on this particular account, produce any very bad effect. But carbon dioxide is not the only thing you will add. You will also add an appreciable amount of moisture, which is a very important matter. The relative humidity, or, perhaps, more particularly the wet-bulb temperature, is a matter of extreme importance. But even this does not exhaust the stock of additions we make. Unfortunately, our gas does not consist entirely of hydrogen and carbon, which if completely burned give rise to more or less innocuous substances. We have other things, and you know better than I do what they are. However, you will agree with me that it is very desirable they should not be brought into the air of any living-room, particularly at a low level.

Then, again, there is the question of humidity. If we heat the air directly, we are going to give rise to a condition, not of saturation, but practically of de-hydration of the atmosphere. We are

going to increase greatly its ability to absorb moisture, but not allow it to do so, except at the expense of the moisture of our bodies. That is the effect of high-temperature convecting devices. We produce highly-heated air-currents which are capable of absorbing (due to their high temperature) a considerable quantity of moisture. In this condition, the humidity of the air is too low, and so leads to dryness of the skin. It is the exact opposite of saturation.

Therefore it is desirable that we should not over-heat the air, and we should not add moisture to it. We should also endeavour to promote a certain amount of air movement, which is brought about mainly by air change. I think I am right in saying that the standard of hygienic efficiency adopted by the Davis Gas-Stove Company, which has been before you for some little time, is quite in accordance with these ideas. This standard provides that a gas-fire shall, when burning at maximum efficiency, pass the whole of its products of combustion through its flue outlet unaided by any form of flue or chimney draught.

Sometimes I fear the ventilating engineer is called so by courtesy only; and I have the same grievance in many cases against the heating engineer. I must admit, too, that I am afraid the members of the gas profession, both makers of stoves and makers of gas, are occasionally apt to forget that they are heating engineers carrying out very important work which touches all people from their very earliest days. I think there is a tendency for the gas man not to remember that he is a heating engineer, and also a ventilating engineer—because the two cannot be separated.

The fire you have before you is constructed so that the whole of the products should pass away through the flue outlet, and none should pass from the canopy into the room. This standard has been argued and fairly well discussed; and experts have been called in on all sides. As a result, the standard has been accepted throughout the profession, and gas-stove makers to-day are at one in building appliances that do comply with this condition. I am pleased to see that so many of our friendly competitors have appealed to the independent authority of the "Lancet" to verify the hygienic efficiency of their more modern productions in the way of heating stoves.

In conjunction with this standard, a new test was devised. I have always found it is very much more convincing to see something; and working on this principle, and experiencing at the same time considerable difficulty in testing the hygienic efficiency of the gas-fire by chemical methods, I turned to purely physical methods. The test which is now well known as the "Shadowgraph" test is the result.

[Mr. Twigg then proceeded with the demonstration of the "Shadowgraph" test, and the display of a series of lantern slides showing gas-fire construction.]

Mr. F. J. Pearce proposed a hearty vote of thanks to the lecturer; remarking that the subject dealt with was one of the greatest importance.

Mr. R. A. Briggs seconded, and said that to the outdoor department the gas-fire was one of the chief items they had to deal with. They certainly had to be both heating and ventilating engineers; but he was sorry to say they often had to depend upon the fire-place for the ventilation of the room. The proper way to ventilate a room was from the top. Frequently they were called upon to fix a gas-fire where a coal-fire would not work; and not only had they to be heating and ventilating engineers, but they had to improve bad chimneys.

Mr. Twigg, in reply, said it was a little difficult sometimes for the stove maker to know exactly what the gas man wanted; and the gas man might have a certain amount of difficulty in telling them. So makers had to find out for themselves, and give what would cover the greatest possible range of conditions. This was really the motive behind the standard of hygienic efficiency. A gas-fire which was independent of the chimney for the removal of the products, he thought it would be admitted, was about as far as they could go. They could not give a gas-fire which could be guaranteed to convert a down-draught into an up-draught.

At a recent meeting of the Aberdeen University Court it was announced that Mr. George Skelton Yuill, a native of Peterhead, of Yuills Limited, colonial merchants, has given £4000 for the establishment of a fund the interest of which is to be devoted to encourage the practical application of the theory and science of chemistry to the arts, manufactures, and industries of Great Britain.

The necessity for taking an all-round view of a chemical process is emphasized, by Dr. Baekeland, in his Chandler Lecture at Columbia. He says: "Some chemists, who have little or no experience with industrial enterprises, are too much over-inclined to judge a chemical process exclusively from the standpoint of the chemical reactions involved therein, without sufficient regard to engineering difficulties, financial requirements, labour problems, market and trade conditions, rapid development of the art involving frequent disturbing improvements in methods and expensive changes in equipment, advantages or disadvantages of the location of plant, and other conditions so numerous and variable that many of them can hardly be foreseen even by men of experience. And yet these seemingly secondary considerations most of the time become the deciding factor of either success or failure of an otherwise well-conceived chemical process."

THE "CRACKING" OF HEAVY OILS.

The subject of "The Chemistry of the Cracking of Heavy Oils" was dealt with by Professor Vivian B. Lewes, F.I.C., F.C.S., at the meeting last Thursday of the Institution of Petroleum Technologists. He explained that his excuse for bringing the paper before the members was the interest taken in the subject at the present time, and a hope that a translation of the facts discovered by Sir Edward Thorpe and Mr. John Young, who read a paper before the Royal Society in 1871, by the light of modern practice, might be of some use. Having described the Thorpe and Young process, he said the conclusion the authors drew from their valuable research was that the simultaneous formation of a saturated hydrocarbon and olefine must be assumed to occur from the loosening of the affinities of certain of the CH_2 groups in the heavy paraffin molecule, and their recombination to form unsaturated hydrocarbons. But the evidence was not sufficient to justify any assumption as to the exact manner of the decomposition. Professor Lewes stated that he had made a very large number of experiments on the cracking of heavy oils, and by interpolating some of the results he thought that a fairly clear idea of the general trend of the actions taking place could be obtained. He then proceeded with his paper, towards the close of which he made the following remarks bearing upon an important present-day question:

"In the process of cracking an oil, after the light cracked fractions have been distilled off, the residuum is generally high in colour, and when again returned to the cracking system, unless well diluted with fresh oil, is liable to give trouble from the deposition of pitch and carbon. But it not only contains naphthenes, but also heavy hydrocarbon molecules capable of being broken-up into naphthenes by further and higher temperatures; and it is worth consideration as to whether it could not be used more profitably for the production of aromatic hydrocarbons.

"At the present time the demand for toluene is increased enormously for the manufacture of trinitrotoluene for explosive purposes; while if a State-aided attempt is to be made to capture the dye industry, the demand for aromatic hydrocarbons—benzol, toluol, xylol, naphthalene, and anthracene—will for some years be far in excess of the supply.

"It will be remembered by many that in 1885, when the demand for benzol was high, Nobel Brothers, Liebermann, Burg, Salzmann, and Wichelhaus investigated the possibility of obtaining aromatic hydrocarbons from petroleum residues; and they got excellent results. The slump in the price during the past twenty-five years, which at one time brought benzol and toluol down to something like 6d. per gallon, led to these processes being abandoned, though I believe the preparation of aromatic hydrocarbons on a small scale is still practised from Russian petroleum.

"The residues from the cracking to form motor spirit at from 500° to 600° C., if they were passed under a slight pressure through a 2-inch tube containing a copper spiral to conduct the heat (the whole being heated to 800° to 900° C. and the oil passed slowly through it), would not only crack hydrocarbons to naphthenes, but would convert the naphthenes into aromatic hydrocarbons, the whole range of which would be found in the tar formed. Something like 80 cubic feet of gas would be produced at the same time per gallon of residue treated, which would be used either as fuel or for the enrichment of water gas after all the benzol and toluol had been scrubbed out of it."

In conclusion, Professor Lewes explained that he had purposely refrained from saying anything about "the latest, and certainly the best, method of motor spirit production by cracking" which he had examined, as the inventor [Mr. W. A. Hall] was present to describe it. Mr. Hall's paper is noticed below.

GAS-WORKS AS PRODUCERS OF MOTOR SPIRIT.

At the Meeting of the Institution of Petroleum Technologists last Thursday, Mr. William A. Hall read a paper on "The Cracking of Oils with a View to Obtaining Motor Spirit and Other Products."

In the course of the paper he expressed the opinion that though "cracking" is undoubtedly in its infancy, it is on the sure road for rapid extension, and must play a very important part in the future. He thought the most economical future source of petrol production in Great Britain and in many other parts of the world would be in the manufacture of water gas; the existing gas-works being admirably suited for the purpose. He said the topic was far too extensive for more than a cursory glance in such a paper as the one he submitted; and he only mentioned it in connection with what appeared to him as a great future possibility. He offered the following remarks on the subject.

There is used for carburetting purposes in the gas-works of Great Britain an amount of oil approximately equivalent to the amount of petrol consumed. The gas oil is cracked at a high temperature into a fixed gas, and mingled with the water gas to an extent sufficient to impart the necessary B.Th.U. and candle power. In practising the process of cracking such an oil, a very valuable bye-product can be obtained—*i.e.*, instead of cracking all the oil into permanent gas, the operation might be conducted so as to yield at the same time a considerable amount of motor

spirit (say, 25 to 50 per cent. of its entire volume), leaving the balance either in the shape of substantially the same gas that would ordinarily be obtained, or as a liquid residue equal in efficiency to the gas oil of commerce. Whether this balance of product is fixed gas or uncracked residual oil depends upon how the process is conducted. But if this "run through" will yield (say) 40 per cent. of motor spirit, worth 10d. per gallon, from gas oil at 3d. per gallon, one can readily see that the balance—50 per cent. or more of the whole—would be obtained free of cost. More plainly stated, a water-gas works, operating a cracking process in conjunction, could produce a bye-product, to the extent of from 40 to 50 per cent., worth per gallon somewhere about three times the cost of the original raw material, and with a ready local market for it.

What the extra cost of such a production would be depends largely upon the process adopted; but 2d. per gallon on the spirit appears a liberal allowance, and should also cover the refining. If such an estimate is correct, the motor spirit would cost about 5d. per gallon. Under such a supposition, the oil for carburetting water gas would cost 1d. per gallon, against 2½d. to 3d. as at present (*plus*, of course, the royalty on rights to use such a process), and would yield in addition a profit in the sale of the motor spirit above 5d. per gallon. The gas-works are all located at points where there is a large consumption of petrol, and many of them are also provided with appliances for handling oil economically in large quantities. Furthermore, with a very cheap oil assured in this manner, it is probable that carburetted water gas would very greatly increase as an article of manufacture, which would considerably augment the supply of motor spirit from such a source. In fact, it rather appears as if a sufficient amount might in time be thus obtained to supply the entire needs of the country, and without much fear of ruinous competition from the existing sources of supply.

As near as I can ascertain, a gas-works could undertake the operation at about one-third the capital cost of a separate company; and its cost to conduct the manufacture would be almost as low in proportion. At a gas-works there would be little or no waste; and every step of the operation could be conducted most economically and in a manner to give the greatest efficiency. For instance, it is well known that a total cracking of oil into spirit is never accomplished in one operation, and that varying amounts of fixed gas and condensable residues are always obtained. The excess gas is usually calculated as fuel for the operation; but it is a very expensive fuel for the purpose. The liquid residues are usually run through a second time; but they are seldom of the same value for the purpose as the original oil. At a gas-works only one run-through need be made, and it can be operated in a manner to yield the most satisfactory and economical results without any consideration of the amount of fixed gas produced, or the quality or extent of the liquid residues, for the reason that the permanent gas can be conducted direct to a holder, and utilized for enriching the water gas along with that produced by complete gasification, as its composition is almost identical. The liquid residues have been found to be of about equal value with any gas oil, and they can be mixed directly with it for the ordinary purposes of carburetting, and the converters or cracking-stills can be much more economically heated by the cheap coke or breeze always present at the gas-works than they can by oil or oil gas.

As near as I can calculate, a gas-works can produce motor spirit by cracking for about 2d. per gallon less than it can be done in any plant solely conducted for the purpose. To this can be added at least 1d. saving in transportation, and probably 1½d. in selling costs. These amount to 4½d.—certainly a very considerable saving. But the matter goes much farther than this. It really means that, as a bye-product, motor spirit can be produced at gas-works, at the very point of its consumption, for about 5d. per gallon. It is difficult to see how even the greatest companies, with all their distributing facilities, could ever meet such competition if it came to a direct conflict; and if it should, the gas-works could simply shut-off the motor spirit production for the period when prices were not remunerative, and this without disrupting its organization or leaving idle any considerable plant. This would not be the case for the competitor. Such low and unprofitable prices would in all probability not continue long; and when the trade returned to a profitable point, the gas-works could quickly and economically resume operations. It would be practically impossible for even the strongest company, or for a combination, to "freeze out" competition of this kind; nor could they do it from control of the raw material, as there are altogether too many producers of crude and residual oils very anxious for a market.

In a cracking process, the ideal appears to be its conduct at a temperature sufficiently low to produce not more than 20 or 30 per cent. of unsaturated hydrocarbons in the finished product, with some means of removing the cracked vapours—*i.e.*, the sufficiently low-boiling fractions—at the very temperature of their formation, conducting them immediately towards a cooler atmosphere, in order to prevent their further decomposition into permanent gas and carbon. I have succeeded in accomplishing this to a very considerable extent by a method which I think is novel, and which at least has proved effective, when conducted in large commercial apparatus, though I have not been able fully to reproduce such results on a smaller scale, in consequence, I presume, of the difference in mass reactions. [The author described the process.]

GAS FROM SAWDUST.

The "American Gas Institute News" for the current month contains the following answer by Mr. ALFRED E. FORSTALL to a question in regard to the production of illuminating gas from sawdust, a ton of which would, the inquirer was informed, produce 20,000 cubic feet of gas.

In regard to the manufacture of gas from sawdust, I have not been able to find any definite information; but there is, in a paper read by Messrs. James Lawrence and James C. Lawrence, before the New York Section of the Society of Chemical Industry, and published in Vol. XXX. of their "Journal" (p. 728),* a statement that they had distilled sawdust, though it had previously been supposed that wood less than 4 to 6 inches diameter could not be advantageously distilled, because of its tendency to burn-up rapidly by reason of an exothermic reaction which starts when the temperature of the charge reaches about 275°C. They found, however, that by heating the retort very slowly up to 100° C., then a little more rapidly to 280° C., and then stopping the external heating until the temperature reached a maximum, when the heat was again applied and the distillation finished by raising the temperature as rapidly as possible to a little over 400° C., fine wood and sawdust could be successfully distilled. They give the results of some ten distillations, but do not give any for sawdust. These results show that from 100 lbs. of wood they were able to get about the following products: Acid liquor, 43·75 lbs.; tar, 3·45 lbs.; charcoal residue, 31·12 lbs.; gas, 21·68 lbs. A specimen analysis of gas is given, which shows that 100 cubic feet had a weight of 8·62 lbs.; so that the yield per pound of wood was about 2·5 cubic feet. The calorific value of the gas was given as 11,493 B.Th.U. per pound, and this figures out at 990 B.Th.U. per cubic foot. The analysis of the gas is given, however, as being:

	Per Cent.
Heavy hydrocarbons	8·16
Marsh gas	12·32
Carbon dioxide	31·45
Carbon monoxide	35·08
Hydrogen	10·94
Nitrogen	2·05

From this analysis I figure the calorific value as 436 B.Th.U. per cubic foot, which seems to agree much better with the composition of the gas than does 990 B.Th.U.

If larger wood were being used, more gas could be obtained by carrying on the distillation at a higher temperature; but from what the authors say, it would be impossible to do this with sawdust, since it would burn-up under this treatment. The charcoal remaining after the distillation was completed would be so fine that it would be impossible to keep it from burning-up, unless the retorts were discharged into an air-tight chamber.

In the discussion on the paper, Dr. C. A. Doremus stated that he had distilled sawdust for the manufacture of illuminating gas, and that the management of the heat and the type of retort were such as to yield gas; but the report of the discussion does not tell how the heat was managed, nor what type of retort was used.

A WOOD CHARCOAL FILTER FOR THE WASTE GASES FROM SULPHATE PLANT.

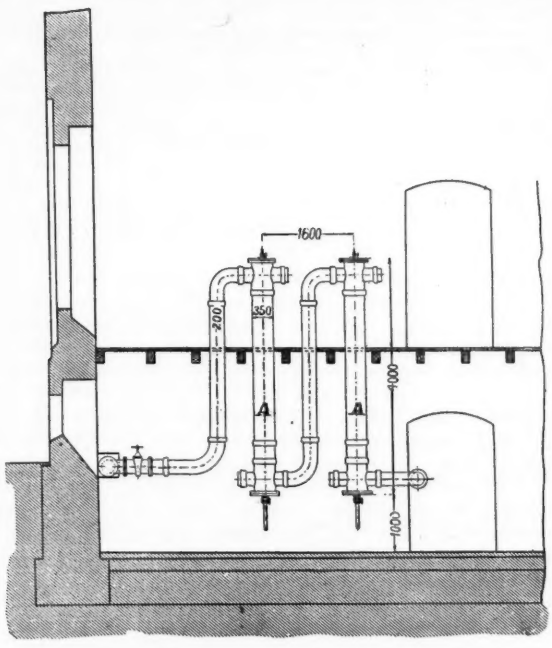
The following is a summary of a short paper read by Herr Reinhard, the Manager of the Leipsic gas undertaking, before the sixty-first meeting of the Association of Gas and Water Engineers of Saxony-Thuringia, on a charcoal filter which has been in use at the No. 1 Gas-Works at Leipsic for rendering the waste gases from the sulphate plant innocuous before discharge into the air. The paper was published in the "Journal für Gasbeleuchtung" for the 6th inst.

The gases escaping from sulphate plant consist chiefly of carbonic acid and sulphuretted hydrogen; and, on account of their very disagreeable smell, they cannot be discharged directly into the atmosphere. The Government Factory Department of Saxony requires in most cases special treatment of these gases—such treatment generally consisting in their being passed through atmospheric or hydraulic tubular condensers or coolers, thence through iron oxide purifiers, and finally into a flue for combustion. The requirements as to cooling and purification by oxide were imposed at both of the Leipsic Gas-Works; but at the No. 2 works, instead of the gases being subsequently burned, they were discharged into the open air through a pipe extending above the roof of the works. These works are, however, fairly isolated; whereas the No. 1 works are in the midst of the town, and are surrounded on all sides by dwelling-houses and business premises. The discharge of the gases without combustion in the same way as at the No. 2 works led to some complaints of nuisance, and the management was compelled to take some action. The combustion of the waste gases could not be readily effected, as the boiler and other furnaces were far distant from the sulphate plant.

Some preliminary experiments on a small scale showed that the

* The paper referred to was noticed in the "JOURNAL" for July 25, 1911 (p. 238).

empyreumatic strongly smelling substances in the waste gases could be got rid of by passage through wood charcool, and as a result of these experiments the plant shown in the illustration was erected. To the pipe which conveys the spent gases from the purifiers to a place above the roof, two vertical pipes 13¾ inches in diameter have been connected. These pipes are each packed with about 165 lbs. of wood charcoal, costing, for the two, about 13s. 6d.



A. Wood Charcoal Filters.

[The Dimensions given are Metres—1 Metre equals 3·28 feet.]

A Wood Charcoal Filter attached to the Sulphate Plant at Leipsic.

After six weeks' working the wood charcoal has been taken out and regenerated by heating in a gas-retort for about three hours. This regeneration causes a loss of about 20 per cent. of the charge. Data cannot be given as to the quantity of waste gases purified in this way; but the liquor worked up in this period in the plant amounted to 550,000 gallons. It should be added that a steam-jet blower has been introduced into the vertical pipe leading to the roof in order to exhaust the waste gases, which are heavier than air. Hence the whole waste-gas connections are under suction. The process has answered quite satisfactorily, and there have been no further complaints from neighbours.

Gas-Engines for Working Gas Plants.

A writer in the "American Gas Institute News" asked for data relative to gas companies using gas-engines for operating their various pumps, blowers, and kindred machinery. He desired some information to compare the efficiency of gas-engines in respect to steam-engines and steam-turbines for similar work. The following is the answer given in the current number of the "News": "Gas-engines are not so reliable as steam-engines for constant 24 hours per day service, as they are subject to ignition troubles and other minor ills that make brief shut-downs necessary at times. Chiefly for this reason, it has not been customary to use gas-engines to furnish power for the important and continuous operations of gas making. Gas-engines are, however, specially suitable for emergency service and for situations where power is required for only a few hours per day. Such situations in the gas business are usually found at outlying holder stations, where it is necessary at certain times to pump gas into booster or belt line distribution mains; and many gas companies have adopted gas-engine power for this purpose. No boilers are required, and the power is instantly available without the necessity of getting-up steam. Gas-engines are equally suitable for taking care of the peak load at gas-works, where the gas is pumped into the distribution mains under pressure. In the matter of economy, gas-engines compare very favourably with steam, as 1 horse-power-hour can be generated with the consumption of from 18 to 25 cubic feet of gas, depending upon the size of the engine and the load conditions."

Converting Quicksand into Rock.—According to a paragraph in "Engineer and Fireman," quicksand can be made into a solid rock and save the driving of piles where it is desired to secure a good strong and lasting foundation for bridges, buildings, or machinery. Take a hand or power force-pump and a long pipe nozzle, and inject liquid cement into the quicksand. One bag of cement will solidify 7 cubic feet of quicksand.

THE AUSTRIAN PETROLEUM INDUSTRY.

The "Zeitschrift des Vereines des Gas- und Wasserfachmänner in Oesterreich u. Ungarn" of the 1st of February quotes a report from the "Zentralorgan für Petroleumindustrie" on the position of the petroleum industry in Austria in the year 1914. The report throws a good deal of light on the petroleum supplies of Austria and Germany since the outbreak of war, and the bearing of the petroleum position on gas undertakings in those countries.

A review of the Galician petroleum industry in the past year must be divided into two epochs, the first being the period before, and the second the period following, the outbreak of war. During the first period there was, in comparison with the year 1913, a considerably increased output of crude oil, and a fall in the price obtainable for it. The production continued to increase from the beginning of the year till August, chiefly owing to the large number of new wells and works which came into operation early in the year. This was due in large measure to the increasing extent to which foreign capital had since the year 1912 been invested in the Galician oil fields. At the end of 1913, crude oil was worth £3 8s. per ton, but later the price fell to £1 16s.

After the outbreak of war, however, conditions changed completely. The interruption of transport facilities, followed by the Russian invasion, brought operations to a standstill in the Galician oil-fields. The proprietors and workmen who were not liable to military service left; and it is not known in Austria what damage has been done to the oil-works and plant. It is assumed, however, that the Russian troops, having regard to the immense sums invested by their Allies in the oil-fields, will not have committed wanton damage. Further, it is believed that the Russians are working many of the wells on their own account—especially since the extension of the war to Turkey has caused interference with the supply of oil from Baku. At the outbreak of the war the refineries had very small stocks; and the price of refined oil, which had fallen to £11 per ton in the beginning of July, rapidly rose, and at the time of the report private dealings were being made at from £26 5s. to £29 13s. per ton. There was, in particular, a shortage of petroleum spirit or naphtha, and supplies were seized by the State. The export of naphtha and crude oil from Roumania to Austria was stopped by the prohibition of export by the Roumanian Government; and although the prohibition was relaxed in so far as kerosene was concerned, the difficulties of transport prevented the import of any considerable quantities.

The "Zeitschrift," in commenting on this report, observes that Austria is almost in as bad a position in regard to the supply of oil as Germany, who has to import the whole of her requirements. The conditions prevailing favour the extension of gas consumption. Efforts are also being made to increase the consumption of gas, for the reason that the supplies of sulphate of ammonia, which is badly needed by agriculturists in Austria at the present time, will be thereby augmented. It is pointed out that any permanent extension of the use of gas which results from these efforts need not be feared by the oil and electricity interests, since it is anticipated that there will be ample scope for the increasing application of both oil and current for industrial and other purposes as soon as the war is over.

SWISS ASSOCIATION OF GAS AND WATER ENGINEERS.

Report of the Annual General Meeting.

The Forty-First Annual General Meeting of this Association was held at Berne, on Oct. 18 last, but, as already reported in the "JOURNAL" [*ante*, p. 27], the proceedings at the meeting were almost entirely confined to the transaction of private business. The official report of the proceedings at the meeting has since reached us; and we extract from it a few further particulars.

The meeting took place at the Bürgerhaus Restaurant in Berne, under the chairmanship of M. Des Gouttes, of Geneva, the Vice-President of the Association. There were present 89 members of all classes, and 5 visitors. The Chairman, in his opening address, pointed out that at the meeting a year ago in Berne, it had been intended to hold the meeting in 1914 at Vevey; but the work of reconstruction of the gas-works there not having been completed, the town expressed a wish that the meeting there should be deferred until 1915, and the town of St. Gall was in the meantime good enough to offer its hospitality to the Association for 1914. The arrangements for the meeting at St. Gall were far advanced when the Declaration of War in neighbouring countries occurred, and the Committee of the Association decided to defer the meeting at St. Gall to a later date, and replace it for the time being with a simple business meeting, for which Berne, where the National Exhibition was being held, seemed the most suitable place. It was decided also to defer presenting the annual report for the year 1913-14 until 1915.

The Chairman then referred to the enormous loss which the Association had sustained by the death of its President, Herr A. Weiss, of Zürich, on Dec. 16, 1913. The Association had also to deplore the loss, since the last annual meeting, of M. Givel, the

Manager of the Gas-Works at Payerne, and Messrs. R. Meyer and E. Hohmann, the managers of works at which gas plant was made. The Association had before it the difficult task of a revision of its statutes, on which a vote was to be taken at the meeting. The gas industry in Switzerland was passing through a difficult time. There were few towns in which the consumption of gas, and consequently the receipts, were not sensibly reduced. For some weeks past there had been great anxiety in regard to the supply of coal; but the assistance rendered by M. Roth, of Zürich, towards procuring supplies of coal deserved a word of recognition. In conclusion, the Chairman expressed the hope that the present troublous times would soon be followed by an era of prosperity for the country and of peace for its neighbours.

The accounts of the Association for the year ending Sept. 30, 1914, showed an excess of expenditure over receipts of 1805 frs. (£72 4s.), which was met out of the accumulated funds of the Association. Ten new members of various classes were elected, making an increase in membership of three on the year, and giving a total of 240. On the motion of the Chairman, two members—M. Meystre, the Manager of the Vevey Gas-Works, and M. Mathys, formerly Manager at La Chaux-de-Fonds—were elected Honorary members of the Association in recognition of their services for the past twenty-five years as Treasurer and Member of the Committee respectively. The Chairman pointed out that two other members of the Committee—Herr Kilchmann, of St. Gall, and Dr. Miescher, of Bâle—had both been for over twenty-five years at the head of the public services of which they had charge in these places. The Diploma of the Association was awarded to five employees who had served over thirty years in Swiss gas or water works.

The meeting agreed, without discussion, to confirming, subject to some modification of wording, the recommendations of the Photometric and Heating Committee with regard to standards of calorific value for gas supplies. These recommendations were quoted in the report of last year's meeting of the Association [*vide* "JOURNAL," Vol. CXXV., p. 80]. New statutes of the Association which had been circulated to members were also approved.

The meeting proceeded to the election of the President and members of the Committee for the ensuing year, and, as already reported, Herr Burkhard, the Manager of the Lucerne Gas-Works, was chosen as President. The meeting in 1914 not having been held at St. Gall as arranged, it was decided, on the invitation of Herr Kilchmann, representing the Corporation of that place, that the 1915 meeting should be held there.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

On Saturday, members of the Association to the number of sixty journeyed to Edinburgh, to visit the meter-works of Messrs. Alder and Mackay. In welcoming the visitors, Mr. Bennet said that these New Grange Works were built in 1890 to his design. They were erected in sections; each section being equipped for one definite piece of work. He wished to call the attention of the members to the system of water-piping throughout the buildings as a precaution against fire; and he told them how these pipes were prevented from freezing during frosty weather.

Three parties were formed and taken round the works, which had been kept running specially for the purpose of the visit. All the processes in the making of wet and dry meters were inspected, as well as the making of prepayment meters, some of the designs of which are due to Mr. Anderson, one of the firm. There was also seen in process of manufacture the well-known Alder and Mackay pressure-wave controllers, and their hurricane-proof lamps; and the finished articles were inspected in actual use in the show-room. Of particular interest was the special five-wave controller, designed by Mr. Anderson for the town of Lurgan. The members were very much interested in the up-to-date machinery throughout the works, but especially in the automatic lathes for making certain parts.

By the kindness of their hosts, the party were entertained at tea in Ferguson and Forresters', in Princes Street. After this, Mr. Bennet (acting as host on behalf of the firm) again welcomed the visitors, and expressed regret that Mr. Mackay was unable to be with them, owing to his having caught a chill. He briefly related the history of the firm from the beginning, and explained how a good many difficulties had been overcome—chiefly by the ingenuity of Mr. Anderson. Mr. David Fulton (Vice-President) replied for the Association, thanking the firm, through Mr. Bennet, for their great kindness in keeping the works running for their benefit, and also for the entertainment. Mr. J. B. Scott, of Cowdenbeath (the President of the North British Association), then made a few remarks, in the course of which he said that he was glad to see how vigorous the Junior Association was—it augured well for the Senior Association. But he wished to remind the juniors that they could, and should, become associate members of the Senior Association. He thought the seniors should, like the juniors, have more than one meeting per annum. Mr. M'Kenzie, Mr. Hutton, and Mr. Scott (all of the firm) spoke, as did also Mr. W. Blair, of Helensburgh, and Mr. M'Ghee, of Glasgow.

"Running Costs of Motor Vehicles" is the title of a paper to be read by Lieut. R. W. A. Brewer, Assoc.M.Inst.C.E., at the meeting of the Society of Engineers next Monday.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Recovery of Toluene from Coal Gas.

SIR,—The article which appeared in your last issue on the above subject contained the statement: "There is from twenty to forty times as much toluene in the gas made from a ton of coal as there is in the tar produced from this bulk of raw material."

In practice, it is found that about 0·05 gallon of pure toluene, or 0·43 lb. may be recovered from 10 gallons of tar, which arise from the distillation of one ton of Durham coal. If the yield of 0·43 be multiplied by twenty and forty, one arrives at the abnormal result of 8·6 lbs. to 17·2 lbs. as representing the toluene content of gas produced by the carbonization of one ton of coal.

May I suggest that an error has arisen in printing the extract under consideration?

E. V. EVANS, Chief Chemist,
South Metropolitan Gas Company.

Old Kent Road, S.E., Feb. 18, 1915.

[Had the range been stated as ten to forty times, it would probably have been more correct than twenty to forty. But it may be taken that knowledge of the toluene question is somewhat limited—for example, it is most difficult to determine the amount of pure toluene in crude benzol. However, the statement made last week was based on experience at Birmingham, and with Birmingham gas and tar. The distiller who takes the bulk of the Birmingham tar states that less than ½ gallon of pure toluene is obtainable from one ton of the tar (20 tons of coal). In fact, he estimates the amount at roughly ¼ gallon; whereas Mr. Evans states 1 gallon as the yield from Durham coal. The Birmingham coal gas contains about 0·4 gallon of pure toluene per 12,000 cubic feet. The ratio is, therefore, about 8 to ¼, or 32 to 1. The fact of the matter is the benzol (*plus* toluol) content of different tars varies very much. Some tars give 4 gallons, others only 1 gallon per ton. Coal gas made by different systems will also vary a great deal. In some cases, the gas will no doubt contain as much as 5 or 6 lbs. of pure toluene per 12,000 cubic feet; in others, only 2 lbs. There is also the possibility of finding considerable quantities in carburetted water gas. Mr. Evans's figure of 1 gallon in the tar is very high indeed; and, if correct, is not considered good modern practice. The gas ought to retain as much of the benzol as possible—the question is one of condensation chiefly.—ED. J.G.L.]

The Settle-Padfield Vertical-Retort Patents.

SIR,—On several occasions during the present crisis, I have received communications (consisting mainly of questions) relative to the patents granted for the Settle-Padfield continuous and intermittent vertical-retort systems.

While at present I am not in the position, nor have I the desire, to express any opinion on these patents, as affecting this country, or the countries at war with us, I feel I can best oblige those inquirers most closely connected with the gas industry by giving the full list of patents taken out for the Exeter process. The New South Wales patent is in force till 1917, and the United States one till 1921.

T. SETTLE.

Exeter, Feb. 20, 1915.

List of Settle-Padfield Patents for the Manufacture of Gas in Continuous and Intermittent Vertical Retorts.

England	June 2, 1902	No. 12,552
,,	Nov. 12, 1903	,, 24,588
,,	Feb. 26, 1904	,, 4,708
France	May 20, 1903	,, 332,267
Germany	June 4, 1903	,, 152,142
Belgium	June 13, 1903	,, 170,935
Austria	June 5, 1903	,, 16,361
Italy	June 15, 1903	,, 174/74
Spain	Sept. 26, 1903	,, 31,941
Denmark	June 5, 1903	,, 7,077
Russia	May 24, 1906	,, 10,770
United States of America	June 4, 1904	,, 762,495
Canada	Jan. 19, 1904	,, 84,883
,,	Aug. 23, 1904	,, 88,928
India	Feb. 20, 1905	,, 320
Transvaal	April 9, 1904	,, 148
Orange River Colony	April 13, 1904	,, 376
Natal	April 11, 1904	,, 117/04
Cape Colony	April 12, 1904	,, 3,112
Rhodesia	Sept. 1, 1904	,, 437
Argentine	May 11, 1904	,, 3,968
Japan	March 30, 1905	,, 8,617
New Zealand	July 24, 1903	,, 16,678
Victoria	Aug. 18, 1903	,, 20,841
Queensland	July 20, 1903	,, 7,374
South Australia	Aug. 20, 1903	,, 6,282
West Australia	July 21, 1903	,, 4,516
New South Wales	July 13, 1903	,, 13,364
Holland	Licence Sept. 13, 1903.	

The Work of the "B.C.G.A."

SIR,—A slight discrepancy has crept into the figures in the second paragraph of your last Tuesday's article, p. 373, regarding the report from the Lancashire Commercial Section. There are 59 members in the section (not 38 as stated), 38 of whom (not 17 as stated) subscribe

to the "B.C.G.A." The remaining 21 have still to be convinced of the desirability of joining. The 38 (not 17 as stated) represent a production of 19,431,094,000 cubic feet of gas.

The correct figures, as you will see, make the statement all the more convincing.

W. M. MASON, Secretary,
British Commercial Gas Association.

47, *Victoria Street, S.W., Feb.* 18, 1915.

Water Purification by Ozone.

SIR,—On my return from the Continent, I have read in your issue of Dec. 22, an account of the "Water Purification by Ozone" at Ann Arbor (Mich.).

The lay reader might, after looking through this paragraph, be led to believe that the method of water purification by ozone was to be regarded generally as a failure. It is usually considered by those who have any knowledge on the subject that a concentration of at least four times that which the paragraph describes as having been used, is necessary for the purification of water. Such a concentration as that given in the paragraph—namely, 0·5 gramme of ozone per cubic metre—is perfectly useless for the purpose of reducing the number of bacteria in water. A sufficient concentration—namely, about 2 grammes of ozone per cubic metre—is easily obtained with proper apparatus; and sterilization of water by ozone under such conditions is not only a perfectly simple matter but is easily accomplished. The resulting water should be quite sterile, and of very much improved appearance and quality—quite apart from the absence of bacterial contamination.

OZONAIR LIMITED,
per EDWARD L. JOSEPH, Director and General Manager.

96, *Victoria Street, S.W., Feb.* 18, 1915.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time: Ashington District Council, Sunderland Corporation (Wearmouth Bridge), Wolverhampton Corporation Water.

Petitions have been presented against the following Bills:—

Altrincham Gas, by the Cheshire County Council, the Altrincham, Hale, and Bowdon Urban District Councils, and the Bucklow Rural District Council.

Ashington District Council, by the Northumberland County Council, the Tynemouth Corporation, the Rothbury Urban District Council, the Morpeth Rural District Council, the Rothbury Hillside Water Supply Company, and the Rothbury Water Company.

Brighton and Hove Gas, by the Brighton Corporation.

Frimley and Farnborough District Water, by the Southampton County Council, the Farnborough and Fleet Urban District Councils, the Hartley Wintney and Basingstoke Rural District Councils, and owners and occupiers of lands and private water supplies.

Northwich Gas, by the Cheshire County Council.

Ormskirk Gas and Electricity, by the Lathom and Burscough Urban District Council.

Prescot Gas, by the Whiston Rural District Council and the Earl of Derby.

South Staffordshire Water, by the Dudley and Wolverhampton Corporations, the Newport (Salop) Urban District Council, and the Cannock Rural District Council.

Sutton Water, by the London and Surrey County Councils, the Metropolitan Water Board, the Wimbledon Corporation, the Carshalton, Epsom, Maldon and Coombe, Merton and Morden, and Sutton Urban District Councils, the Epsom Rural District Council, the Ewell and Wellington Parish Councils, and owners, lessees, and occupiers of mills, &c., on the River Hogsmill.

Wolverhampton Corporation Water, by the Salop County Council, the Wolverhampton Corporation, the Newport (Salop), Oakingates, and Tettenhall Urban District Councils, the Littleshall Company, and the South Staffordshire Water Company.

Yorkshire Electric Power, by the Barnsley, Bradford, Brighouse, Halifax, Huddersfield, Keighley, Leeds, Mossley, Rotherham, Sheffield, and Wakefield Corporations, the Bingley, Bolton-upon-Dearne, Earby, Greasborough, Hebden Bridge, Horbury, Oakworth, Saddleworth, Silsden, Thurnscoe, Wath-upon-Dearne, and Wombwell Urban District Councils, the Keighley, Rotherham, and Tadcaster Rural District Councils, Samuel Fox and Co. and the Stocksbridge Urban District Council, the Calverley and Horsforth District, Conisbrough, Garforth, Kildwick Parish, Otley, Penistone and District, Wakefield, and Yeadon and Guiseley Gas Companies, and others.

Bills and Orders for the Session.—The Board of Trade report on the Bills and Orders for the present session was issued last Thursday. There are 31 Gas and Water Bills (including three among the Tramway Bills), 14 of them relating to gas, 4 to gas and water, and 13 to water only. The total capital proposed to be raised amounts to £2,601,827, or £3,237,362 less than in 1914. There are 12 Provisional Orders relating to gas and 3 to water. The proposed capital is £272,826 for the former and £22,450 for the latter—a total of £295,276.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill presented, read the first time, and ordered to be read a second time: Skegness Gas.

Bills read a second time and referred to the Examiners: Southend Water, Weardale and Consett Water.

Petitions have been presented against the following Bills:—

Metropolitan Water Board, by the Surrey County Council and the Wandsworth Borough Council.

Weardale and Consett Water, by the Board of Conservators for the Fishery District of the River Wear and Thomas Charles M'Kenzie.

LEGAL INTELLIGENCE.

SWANSEA LIGHTING AGREEMENT DISPUTE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Tuesday, Feb. 16.

(*Before* THE MASTER OF THE ROLLS, *Lord Justice* PHILLIMORE, *and Mr. Justice* JOYCE.)

Swansea Gaslight Company v. Swansea Rural District Council.

This appeal, a report of the first two days' proceedings of which appeared in the last issue of the "JOURNAL" (p. 396), was concluded to-day.

Mr. GEORGE CAVE, K.C., and Mr. PERCY WHEELER (instructed by Messrs. R. W. Cooper and Sons) appeared for the appellants; Mr. A. C. CLAUSON, K.C., and Mr. TOMLIN, K.C. (instructed by Messrs. Lees and Co., Agents for Mr. Edward Harris, of Swansea), represented the respondents.

Mr. TOMLIN, continuing his argument on behalf of respondents, contended that a contract to lay mains and supply gas outside the limits of the Gas Act was clearly *ultra vires*, as the Company could not contract to do something which was outside their power. Either the Company had power to do what they proposed to do, or they had not; and the moment they went beyond the line, there was absolutely no contract at all. It was not a question of who was plaintiff or who was defendant, if there was no contract no one could sue upon it. Whether the Council had been in the wrong from beginning to end, the Gas Company had also been in the wrong. They came into Court asking for something which, however wrong the Council might be, they could not possibly get; and therefore the judgment of the Court below ought to be sustained.

The MASTER OF THE ROLLS: Mr. Cave, will you be content if we discharge the order of Mr. Justice Warrington, and make a declaration that the agreement of 1909 has not been superseded except so far as it is affected by the Provisional Order?

Mr. CAVE: Quite.

The MASTER OF THE ROLLS: Then we need not hear you in reply.

Judgment.

The MASTER OF THE ROLLS said this was an appeal from the order of Mr. Justice Warrington, which had taken a very considerable time to argue, and in which they had listened to a great number of points, upon which it was not necessary to give an opinion. It appeared that there was a document—he used the word advisedly—executed in 1909 under seal by the Gas Company and the Council; and the main point which had been argued was this: It was said that this document had been superseded or cancelled by an agreement made in the lobby of the House of Lords by the representatives of the two bodies who were then and there present. The Rural District Council objected to a Provisional Order on certain grounds; and it was said that in the lobby, before the Bill came on for confirmation, an agreement was come to by parole between the respective representatives—the result being that the opposition was withdrawn, and the Bill, with certain modifications, was passed. In order to establish the proposition contended for, it was essential respondents should show that there was a contract made in the lobby between the parties. Nothing short of this would do for there to be a binding contract. The learned Judge having seen and heard the witnesses—one side asserting, the other side denying, that such a contract was made—had come to the conclusion, as a matter of fact, that there was no such bargain; and in the face of this finding it seemed quite impossible for them to take a different view of the facts. It was more reasonable to suppose there was such an agreement. But, whether there was or not, it was impossible to interfere with that finding of fact; and, if it were necessary to go further, he should say this was the true conclusion to come to upon the evidence. The learned Judge had said, although there was no binding agreement, still the parties proceeded on the footing that there was some such agreement. This was a proposition upon which there had been no real argument. The respondents argued that the parties acted on the footing that there was such an agreement; and if he had arrived at a different conclusion, it would have been necessary to consider whether the Council could enter into a contract of the nature here suggested. However, it was not necessary to decide this point, and he desired to guard himself by saying he did not assent to any such proposition. This was substantially all there was in the case. It was, however, said by Mr. Tomlin that there was a further objection—viz., that the agreement of 1909 was *ultra vires* the Gas Company, and it was irrelevant to say that a subsequent Act, obtained in 1910, extended the limits of supply and validated the contract if made after that date. But the learned Judge had found, as a fact, that applying for, and obtaining, a Provisional Order was in the minds of both parties; and to say that a contract made in such circum-

stances, followed by an Act of Parliament, enabling the parties to do what they conditionally agreed to do, did validate the contract, and that it was not open to the other party to say the contract could not be enforced as there was no mutuality, was not a valid point. It was sufficient to say there were no grounds for supporting the judgment of the learned Judge, dismissing the action with costs. This being so, what ought the Court to do? He thought they should discharge the order and make a declaration that the agreement had not been cancelled or superseded by any such agreement as was alleged to have been made in the lobby of the House of Lords, or otherwise, except so far, if at all, as it might be modified by the Provisional Order itself. If any questions should arise as to particular clauses of the agreement, they could be decided hereafter upon evidence directed to them. Counsel for the appellants having admitted that clause 16, to the extent of the first limb, was *ultra vires*, there would be a declaration in the terms mentioned.

Lord Justice PHILLIMORE concurred, and thought the declaration should be prefaced by a recital that Counsel for the appellants admitted that so much of Article 16 as sought to restrain the Council from putting in force the powers conferred upon them by the Llamsamlet Provisional Order was invalid.

Mr. Justice JOYCE concurred.

The appeal was accordingly allowed with costs; but no costs were given of the trial in the Court below. The declaration was in the following terms: Declare that the agreement has not been cancelled or determined by any such agreement as is alleged in the defence, nor was it varied, save, if at all, so far as it was varied by the Provisional Order.

Sligo Gas Company and the Corporation.

In the Chancery Division of the High Court of Justice in Ireland last week, the Master of the Rolls granted an application on behalf of the Sligo Gaslight Company for an injunction restraining the Sligo Corporation and Messrs. Grainger Bros., of Holywood, co. Down, and their officers and workmen, from using any steam or other roller in such a way as to damage or injure the gas-mains, service pipes, or other works of the Company pending the hearing of an action. It was explained that a police constable's property had been injured by a gas explosion, and proceedings had been taken against the Gas Company.

Damages for an Accident on a Tarred Road.

Judgment has been delivered at the Newton Abbot County Court, by his Honour Judge Lush-Wilson, K.C., in an action in which Mrs. Edith Warren claimed £50 damages from the Devon County Council and Messrs. Fothergill Bros. (contractors), for personal injury sustained last July by being thrown out of a trap, owing to the slipperiness through alleged inefficiency in tar-spraying of the road between Newton Abbot and Teignmouth. His Honour said the negligence alleged was that the tar was not properly spread on the surface of the road, and that not sufficient sand or other suitable material was used with the tar. The Road Board had issued printed general directions and a specification as to tar treatment of roads; and he was of opinion that the work was substantially carried out in accordance therewith. He did not find negligence up to the point of completion of the work actually done on the part of the defendants. The accident happened while plaintiff was driving down Warren Hill, and plaintiff was thrown on her head against a bank, and sustained considerable injury. A large body of evidence was given by independent people who, in using the road, had found it slippery and dangerous. On the other hand, much expert evidence was given that the tarring was well done. It was admitted by officials of the County Council that some weeks after the accident, in consequence of complaints of the public, sand or gravel had been thrown over the surface on certain hilly parts of the road. He was of opinion that on the day of the accident the surface of Warren Hill and other parts of the road in question was in a slippery and dangerous condition; that such slippery and dangerous condition would have been avoided if defendants had performed the operation of sprinkling enough loose sand or gravel on the surface after the tar had sufficiently dried and before the public were invited to use the road; and that it was negligent on the part of the defendants not to have performed this operation. Was the omission to lay loose sand or gravel on the surface after the tar had sufficiently dried, before the public were invited to use the road, misfeasance? Having looked into the authorities, he had come to the conclusion that the breach of duty on the part of the authority was misfeasance, and not merely nonfeasance. He therefore gave judgment for the plaintiff for £50. After discussion, it was agreed that the judgment should be only against the County Council; and a stay of execution was then granted.

Thirlmere Water Supply.—The Chairman of the Water Committee (Alderman Holt) announced at the last meeting of the Manchester City Council that the laying of the third line of pipes from Thirlmere was now completed, and that water was coming through to the Audenshaw reservoirs. The work was commenced in 1907, and had thus taken nearly eight years to carry out. There were now three lines of pipes in use from Thirlmere, which together conveyed to the city 30 million gallons of water a day. The pipes had had to be enlarged since the first line was laid, as it was found after a time that, from corrosion and other causes, they would not deliver the 10 million gallons a day which was estimated; and it would be necessary when arranging for other pipes to consider the question of still further enlarging them to carry the full quantity available. The cost of the third pipe would amount to £1,067,974, bringing the total outlay to date on the Thirlmere scheme to £4,781,103. At the present time there was an available supply from all sources of 55 million gallons a day; but if the same rate of increase was to be expected in the future as in the past, it would be necessary very shortly to consider the question of a fourth pipe.

MISCELLANEOUS NEWS.

GAS ENGINEERSHIP AT HUDDERSFIELD.

Termination of Mr. E. A. Harman's Services.

At a Meeting of the Huddersfield Town Council last Wednesday, there were confirmed, without comment, the minutes of the Gas and General Purposes Committee, to the effect that notice should be given to terminate the services of Mr. E. A. Harman, the Gas Engineer and Manager, who has held the position for eighteen years.

As to the events which led up to this severance of Mr. Harman's long and efficient management of the undertaking, it may be stated that everything was going on smoothly until twelve months last November, when the political complexion of the Council was changed by the Conservatives obtaining a majority—for the first time since the incorporation of the town in 1868. Owing to this, there was a reconstruction of the aldermanic bench, on Party lines; and by reason of this four Liberal aldermen were not re-elected, but were replaced by four of the opposite political side. Subsequently, there came a reconstitution of the Committees; and in the course of this, Alderman W. H. Jessop, J.P., a past Mayor and "Father" of the Council, who had with great success acted as Chairman of the Gas Committee for twelve years, was transferred to the chairmanship of another committee, and a younger man was put at the head of the Gas Committee. The Gas Committee thereupon nominated a Labour member as the Deputy-Chairman, in place of Alderman Ernest Shaw (who had not been re-elected an alderman). The Labour member, however, announced at the first general meeting of the re-constituted Gas Committee that his party would not allow him to accept the position, as they required him to have a free hand in all matters connected with labour. The Committee then elected another of the members as Deputy-Chairman. After these changes were made, it was generally mooted that the Liberal party would, being on the Committee in control, effect improvements in the gas administration, as compared with the twelve years previously under Conservative control.

Everything apparently was going on well until last December, when the new Chairman insisted that the Manager must be superseded; and several meetings were held, in the course of which it was suggested to Mr. Harman that he should resign. This, however, as there were not any specific charges made against him, he emphatically declined to do; and this position he has maintained throughout. In consequence of the firm attitude on the part of Mr. Harman—or, at any rate, so it seems—the Chairman resigned his position on the Council, and he appears to have drawn some amount of sympathy towards him in the circumstances—an effort having been made to secure his re-election. In view of the position that Mr. Harman had taken up, he was peremptorily told that he would have to go; and after the long period of service referred to, he ceased, within 48 hours of this intimation, and with only three months' salary as compensation, to be in any way connected with the works.

During the controversy that has taken place between Mr. Harman and the Committee—or a section of it—a number of questions were submitted to him for him to reply to in the form of a report. The nature of these questions will be gathered from the answers which Mr. Harman made to them, an epitome of which will be found below, together with a statement showing the financial and working results that have been achieved during his tenure of office, and which results stand greatly to his professional and personal credit.

Mr. Harman's Replies to Questions.

Coal not Properly Carbonized.

The carbonization plant was designed and in use previous to Mr. Harman's appointment, and has produced excellent results in gas, coke, tar, and other residuals—fully as good as those obtained in other towns. The conditions of carbonizing have not altered; and any deterioration in the carbonizing results is due to inferior coal. Previous to this season, Huddersfield coke has been specially asked for, both for the shipping trade all over Europe and for land sale all over England; but the coal now used has resulted in numerous complaints with regard to the quality of the coke. This coke is the fuel used for heating the retorts, and has made it impossible for the fireman to always keep the retorts at the maximum heat; and lighter charges have had to be adopted, which mean a smaller make of gas per retort per day.

Yard Foreman Being Unsuitable for Position.

This man was appointed in 1910, at 45s. per week. He is now 53 years of age, and has been at the gas-works 28 years. He acted as deputy foreman for many years, in which position he gave entire satisfaction. He knew the position of all the valves, connections, wells, and syphons on the works above and below ground; and only one other man was eligible, whose health was extremely precarious. In 1914, having regard to the continued development of the works, and the numerous extensions in progress, the Chairman expressed a wish that he should be superseded. The man was the best available in the works, and the best obtainable at the wages paid. Mr. Harman has always pleaded for a better educated man than either this man or his predecessor, at a wage of £4 a week at least. This is entirely a matter for the Committee. He has also been of opinion that a superior man would have relieved him of some of the responsibility. But he had no better man to suggest; neither does he think it possible to get a highly trained man to accept a foreman's position and wages.

Lack of Supervision by the Engineer.

Mr. Harman's reply is that he has spent as much time in the works as he has deemed desirable and consistent with his other duties. Absence from the works is imperative—arising from mainlaying, service and district work, engagements with the Committee, Chairman, and others; also numerous negotiations, as, for instance, during the

past year, for the purchase of the Longwood Gas Company, the Slaithwaite Gas Company, the Kirkheaton Gas Company. The untidy condition of the works has been a constant source of vexation; but this has been inevitable, with the many extensions on hand, some of which are as follows: New gasholder, 4½ million cubic feet capacity; gasholder main connections, 36 inches diameter; sulphate of ammonia plant for 6 tons daily, with the necessary connections; two new Lancashire boilers and seatings, 9 feet by 30 feet; two new weighbridges suitable for motor traffic; a new condenser and connecting mains, syphons, &c.; the conversion of an old gasholder tank for tar-storage purposes; Crosland Moor 18 inches diameter main; Dalton new gas-mains under consideration; new carbonizing plant for 2 million cubic feet daily; street lighting experiments; and a proposed tramway scheme for conveying materials into and from the works, &c. The difficulty in the disposal of surplus coke owing to the war has involved the stacking of some thousands of tons of coke and breeze, which makes a lot of dust about the works. There has not been any lack of supervision, nor neglect of responsibility.

Has Mr. Harman Taken Part in the Purchase of Coal?

Before the present Chairman was appointed, the Committee always accepted Mr. Harman's recommendations, and bought recognized gas coals. This year he has had nothing to do with it. He has received all his instructions direct from the Chairman, who has held very strong views upon the matter, and has personally negotiated the business entirely upon his own lines. He authorized the purchase of samples of gas coals for testing purposes; and the results were all given to him. Many of the negotiations by correspondence, telephone, and interviews have been transacted direct between the Chairman and agents. Mr. Harman has always strongly recommended the Coal Committee to buy known gas coals of good quality, as being most economical; but the whole object of the Chairman this year was apparently to break the supposed coal ring at any cost, irrespective of quality.

How Long has Mr. Harman known that Certain Retorts have not Burnt Coal Off?

No retorts have, to the Engineer's knowledge, failed continuously to burn coal off.

The Last Purchases of Coal.

In the next section of his report, and also in a subsequent communication, Mr. Harman deals at some length with the purchase of certain lots of coal, adducing evidence to show that it was the Chairman (and not he himself) who negotiated the contracts. As to the question of testing, he agrees, in reference to one case, that the contract was made before the test could be attempted. But it was, he says, the Chairman who made the contract. As to another contract, the coal-test plant was let-down by the Chairman's instructions two months before the purchase was made. In finally disclaiming having taken part in the purchase of the coal, Mr. Harman says some of that bought is entirely unfit for stacking, as it speedily heats and fires.

A Record of Good Work Done by Mr. Harman.

In the concluding part of his report, Mr. Harman responds, in the following terms, to an invitation to add to the answers to the definite questions set anything else he might wish with regard to the undertaking.

The Chairman has expressed his opinion that the works were neglected, and no consideration given to future requirements. I respectfully beg to differ. The demolition of two old gasholders and the erection of a colossal new one afford corroboration of this. For some time it has been recognized that an extension of the carbonizing plant would be required; and visits have been paid to several gas-works to ascertain the best system available. Endeavours have also been made, but without success, to secure a site adjoining the railway.

For many years the gas undertaking of Huddersfield has had a reputation for its progressive methods. It was one of the first to adopt the laying of free service-pipes and the hiring-out of gas stoves and fires fixed free at low rentals. It was also one of the first towns to adopt the prepayment meter system, and to-day supplies the most gas for a penny of any town in the United Kingdom, except one, and that one does not supply a free gas-cooker as does Huddersfield. The price of gas is the lowest of any municipality in Yorkshire.

It is allowable, under your present instructions, to give a comparison of some of the returns in the year 1897 (when I had the honour to be elected your Engineer and Manager) and the present year. Some of the results are as follows:—

72 miles of trunk mains have been laid in the district.
11,600 new service pipes have been laid, in addition to thousands of renewals.
20,000 slot-meters have been fixed.
28,454 cooking-stoves and gas-fires have been fixed.
3000 lamps have been converted from flat-flame to incandescent.
Sulphur recovery process built.
Price of gas reduced from 2s. 9d. per 1000 cubic feet to 2s. for lighting purposes. Price of gas reduced from 2s. 3d. per 1000 cubic feet to 1s. 6d. for engines and stoves. An all-round reduction in the prices of gas of 9d. per 1000 cubic feet. These reductions in prices of gas alone have made a concession to the gas consumers of over £200,000.
£52,847 has been paid from profits to the relief of rates.
£52,792 re-construction debt has been paid off.
Charges for laying service-pipes and fixing meters and stoves have been abolished.
Street lighting charges have been reduced.
Meter and stove rents have been reduced by 75 per cent.
The total capital expended on the works (including the original purchase price of £130,336) up to the year 1897 was £322,655, and up to the year 1914 remained at this amount.

	s.	d.
1897, the capital per 1000 cubic feet gas sold . .	12	6
1914, " " " . .	7	5
Reduction .	5	1

1897, gas sold	516,000,000 cubic feet.
1914, "	869,000,000 "
Increase,	353,000,000 cubic feet.
1897, depreciation and contingencies fund . .	*Nil.*
1914, " " " " . .	£46,939 (For new holder, &c.)
1897, sinking funds accumulated	£45 745
1914, " " "	122 425
1897, rents, rates, and taxes	£5,534
1914, " " "	8,606
1897, reconstruction fund debt owing to bank.	£52,792
1914, " " " " .	*Nil.*
1897, number of gas consumers	20,016
1914, " " "	31,662
Increase . . .	11,646
1897, penny-in-the-slot meters, amount collected in year	£133
1914, penny-in-the-slot meters, amount collected in year	31,625

During the whole eighteen years of my term of office, not a penny has been expended out of capital; the whole of the extensions and payments detailed above having been paid out of the annual profits. While the policy of the Committee has been an admirable one, and in the highest interests of the Corporation, it will be admitted that it does not reveal the revenue returns at their best.

It has been my utmost endeavour to loyally perform all the requirements of the Chairman by keeping the numerous appointments, supplying statements, reports, answering questions, and in all other ways.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held on Friday, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. Paddon, M.Inst.C.E., the Chairman, presiding.

The Secretary (Mr. E. L. Burton) read the notice convening the meeting; and the report and accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said that if the proprietors would look at the former, they would find it stated there that there had been an increase in the business of 1·73 per cent. for the six months now under consideration; and this was in itself satisfactory, because, as they knew, very many of the largest undertakings in the country had had to record a diminution in their output. Like them, the Brighton Company had had to suffer the restrictions of public lighting imposed by the Government in the interests of the community; and this restriction in their own case had been quite as drastic as in any other instance of which he was aware. To achieve an increase in the business, notwithstanding this fact, was a matter of congratulation.

THE ACCOUNTS FOR THE HALF YEAR.

Turning to the accounts themselves, the capital statements showed that the powers of the Company with regard to the issue of capital in the future had not been reduced during the period under review, and that they had an ample margin should they desire at any time to resume the issue of capital. In the capital account, the only really important item on the credit side was a slight diminution in the Company's favour, as compared with a year ago, by reason of original capital extinguished under their powers. On the other side, it would be seen that there had been expended during the half year £1738 on new meters; and that, under the head of depreciation, capital had been extinguished through the revenue account to the extent of £2506. So that the position in this regard had been slightly improved. The only other figure in this account to which he wished to call attention was the balance of capital account £64,283. The capital raised per million cubic feet for the purposes of the business was now only £484, which was, he believed, the lowest figure at which it had ever stood in the history of the Company. The Directors were not without hopes that it might be still further reduced; but circumstances would render this process a slow one, as compared with what it had been in the past. Glancing at the revenue account, it would be seen, as stated in the report, that there had been sold over 12 million cubic feet more gas during the past half year. This had, however, been sold at a price 2d. per 1000 cubic feet less than in the corresponding period of 1913. Now, 1d. per 1000 cubic feet meant £7000 over the year, which was equivalent to the amount attaching to 2d. in the half year. If, therefore, they had not reduced the price of gas by 2d., they would have been about £7000 better off. But though they had foregone their power to charge to this extent, they were only £3423 down on the account; so that they had made up nearly one-half of the amount of the reduction by the increase of business. The receipts from meters, stoves, and fittings had increased by £833; and this was an item of importance very much greater than its dimensions indicated, because it amounted to a record of the implements put out by the Company for the production of revenue during the six months. For instance, it meant 819 more meters out than before. Under the head of residual products, the receipts had been reduced by £4023; but although this was an important sum, it was not so great a percentage as that incurred by the Metropolitan Companies.

GAS PRODUCTION—DEPRECIATION AND MAINTENANCE.

The gas sold per ton amounted to 12,142 cubic feet; and the quantity used on works or unaccounted for was only 5·38 per cent. When the proprietors realized that the district supplied was a very scattered one, involving several rural areas, and, by reason of the contour of the town, the distribution of gas over a very long stretch of coast, he thought they would agree that this latter figure was a very small percentage to record. The total receipts were £7504 less than a year

ago. On the other side of the account, coal had been 9½d. per ton cheaper than before; and there had been saved £841 under this head, notwithstanding that more gas had been made. There had also been a saving in the items of repair, maintenance, and renewal of mains, stoves, and fittings and repair and maintenance of meters—involving the question of depreciation in each case. But when they came to add together the total amount charged to depreciation and maintenance in the present accounts under the heads named, and also repairs and maintenance of works and plant, it amounted to 9·31d. per 1000 cubic feet, which was a very sufficient sum for a Company like theirs, who had always maintained a high pitch of efficiency in their works and appliances. It was in excess of the figure allotted in the case of many Metropolitan Companies; and he hoped that the Brighton Company would always improve upon their record and their practice in this particular regard.

PATRIOTISM AND ABNORMAL CHARGES.

There were on the present occasion some abnormal charges which weighed against them in the matter of comparison, but which nevertheless the Board were confident the proprietors would agree should have been incurred. One item was "Allowances to dependants of men serving with His Majesty's Forces, £1092." This was a charge which most companies were meeting in some degree or another; and if it was large in the case of the Brighton Company, this was to the credit of their employees, and of themselves in bringing it into account. Of their employees, 230 were serving their country; and this amounted to 28 per cent. of those in the service of the Company. Of course, an undertaking like this employed a great number of old men, and of men who were not selected for their physical qualities, as well as many youths and boys, so that 28 per cent. serving with the Colours was a high figure. In fact, he thought it was as high a one as he had known yet.

SOME MORE FIGURES.

The profit of £27,125 was £1544 down. The profit and loss account showed that there was brought from the previous account £37,569, and there was to be carried to the next account £35,711, which indicated that there was a deficiency in the half year of £1857. The Directors could very easily have avoided showing any deficiency at all by making certain reductions in the revenue account under the items to which he had referred; but this would not have been in their opinion good policy. The result stated had been achieved without cutting matters too closely. There had been contributed to the National Relief Fund and other war funds £682, which was a very considerable amount. As to the reserve and special purposes funds, these were invested to the extent recorded in the accounts, and available for any exigencies which might arise; but, of course, this was no time to dispose of securities. The amounts were qualified to a certain extent by depreciation; but, as would be seen, adding the two together and taking them at their value on Dec. 31—a very depreciated standard—the total came to £77,366, which was a very important sum for the Company to have behind them. With regard to the capital redemption fund, in the present accounts no amount had been allocated in this connection, for these were no times to proceed with apportionments of this description. When matters improved, it was hoped to resume the practice. They had already spent £14,384, and had redeemed stock of the nominal value of £7375; and this spared them an annual charge of something like £800 or £900. There was £813 allotted to the purpose of the benefit fund account, which was ½d. per 1000 cubic feet. The Company were empowered to take ¼d.; and a year ago they did so. But pensions and gratuities had cost £642, as against the £813 brought into account; and this, being less than ½d., showed that the situation was well in hand. The total of £2204 which was available was well ahead of anything that could be required. In the balance-sheet there were two items to which he ought to refer. On the credit side, it would be seen that, on account of prepayment meter fittings, stoves on hire, &c., there had been expended £80,883 which did not appear in the capital account; and this more than off-set the balance of £64,283 there shown. It had been the custom of the Company to keep this as a sum to carry in suspense, adding to it and writing it off in the ordinary way from half year to half year; and while they could maintain the policy of not issuing fresh capital, this was perhaps the more convenient form of procedure. But in regard to a company who felt themselves compelled to issue fresh capital—and they might fairly do it, as they had not raised any for fourteen years, and had extended their business nearly 40 per cent. in the intervening period—it would be different. If therefore policy demanded a fresh issue of capital, this matter should be adjusted, and the balance should be written-off the capital account before they proceeded to raise any further capital—a course which at present they hoped to avoid.

AS TO THE FUTURE.

Like the Directors, he supposed the proprietors would be mainly concerned with the future, and would realize that this involved an intense degree of anxiety and solicitude in respect of all those who were responsible for the administration of gas companies. Of course, the unhappy circumstances of the war applied generally to the gas undertakings throughout the country; but the incidence was not equal. It affected different companies in different degrees. To consider the disproportionate effect, one should divide gas undertakings roughly into four kinds. There was the undertaking which drew its supply of the raw material—coal—direct from the colliery into its works, near or far, by railway trucks. This sort of undertaking was not so very seriously affected. The transit was inland, and remote from the worst contingencies of the war. Then there was the second class of undertaking, which still took its coal by railway delivery, but where the coal was in part carried by sea freight. They were more affected than the first class, because they were subjected to derangement of the seaborne portion of their supply. Next came the undertaking that received the whole of its coal supply by water, from (say) Newcastle to London, but got it in very large ships, and therefore could receive it by any form of freightage that was available. Lastly, he came to the fourth denomination—in which the Brighton Company were included—who obtained their coal entirely by water, but were limited to a certain size of ship and a certain class of freightage; and this class suffered more than any of the others, because alternative methods of transport were not available, and they were vulnerable to a very much greater degree than others. It would therefore be realized that the anxieties of the Directors were of an exceptional kind. The Company's oil had to be brought in a similar way; and, again, they had been adversely affected, because the Admiralty had taken the steamer on which they had depended. He did not think it was any good indulging in any optimism with regard to the future. Generalities and irresponsible platitudes were very much out of place It was no part of his duty as Chairman to inspire the proprietors with a confidence which was not sustained by facts. The real situation was that everything had been done which prescience and prudence could dictate. The affairs of the undertaking were involved in the general incertitude of the great war; and they none of them knew what might happen from day to day. The proprietors might rest assured that the Directors would take every possible precaution, and try to foresee everything so far as they were able; but they could not do more than this. There was a very large margin of uncertainty lying utterly beyond their control; and they could only await events with such confidence and patience as their efforts in anticipation could afford them.

The DEPUTY-CHAIRMAN (Mr. G. W. Carey) seconded the resolution, which was agreed to without discussion.

RISE IN THE PRICE OF GAS FORESHADOWED.

The CHAIRMAN, in proposing the payment of dividends for the half-year at the statutory rates of 6 per cent. per annum on the "B" preference consolidated stock, 4 per cent. per annum on the "C" preference consolidated stock, 11½ per cent. per annnum on the "original" ordinary consolidated stock, and 8½ per cent. per annum on the "A" ordinary consolidated stock, said the proprietors would not in reason anticipate the maintenance of dividends at this standard. An increase in the price of gas would be necessary. The extent and the date would be made known in the usual way; and, of course, it might be taken that this would affect the dividend of the Company. He need hardly say, however, that the Directors would do nothing in this way beyond what they considered was demanded by the exigencies of the case.

Mr. A. F. PHILLIPS seconded the proposition, which was agreed to.

Next, Mr. F. H. Jones and Mr. J. M. Miles were re-elected Directors, on the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN; the former remarking on the great value of the services rendered by both gentlemen. Mr. G. C. Whiteley was also re-appointed one of the Auditors, and Mr. William Cash a Special Auditor.

VOTES OF THANKS.

The CHAIRMAN then proposed a vote of thanks to the officers of the Company. He said that, for reasons which he had already gone into, the proprietors would realize that the burden thrust upon Mr. Cash, the Engineer and General Manager, was a very heavy one. He had had to deal with an increased demand for gas, and at the same time he had been extremely anxious as to whether the necessary supplies would reach him. As to Mr. Burton, he had been an unfailing source of strength and support to the Directors. The other officers also deserved thanks for the way in which they had discharged their duties during this absolutely unique period of stress and trial.

Mr. PHILLIPS seconded the proposal, which was heartily passed.

Mr. CASH, in response, remarked that at the last meeting he had told them that they would all pull together. They had done so. Everyone had done his level-best. He had never expected to live to see the sea-front of Brighton in darkness; but the lamps on the front, electric and gas, had been extinguished, and the streets had been only partially lighted. It had a most depressing effect on one. He trusted that before long they would be in a better position; and that, notwithstanding the restrictions of lighting, and so on, the use of gas by cookers and fires would amply make up for any little loss they might sustain in the public lighting.

Mr. BURTON also acknowledged the vote. He remarked that there was a temptation to sell stocks at the present time, because of the uncertain outlook; but he would suggest to every proprietor who was not under compulsion to sell that he should hold his stock in the Brighton Company for better times—for better times undoubtedly must dawn directly the terrible war was over.

Mr. A. W. OKE proposed a vote of thanks to the Chairman and Directors for their services during the past half year. He said that when they considered the very careful management in the past, and the fact that gas had not been sold at too low a price, but at one which was reasonable having regard to the price of coal in the district, they had cause to congratulate themselves. They had fallen on evil days; but the Company were in a strong position to meet them.

Mr. W. RICHARDS seconded the motion, which was passed, and briefly acknowledged by the CHAIRMAN.

NEWCASTLE AND GATESHEAD GAS COMPANY.

Increased Sales with Decreased Profit.

The Annual Meeting of the Company was held last Tuesday, at the Offices, in Grainger Street West, Newcastle-on-Tyne—Sir W. H. STEPHENSON, D.C.L. (the Chairman), presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, said that the revenue from all sources had been £511,814, compared with £513,453 the previous year, a decrease of £1639. The expenditure was £416,162, compared with £393,453, an increase of £22,709. There was a decrease of gross profits for the year of £24,348. The gross profits were £95,652; and the amount brought forward from 1913 was £20,824, making £116,476 for disposal. Out of this had been paid interest on debenture stock and other loans, £24,660; and interim dividends, £42,953; leaving £48,863, out of which the Directors recommended the payment of final dividends on the preference and ordinary stocks at the rates of 4 and 4½ per cent. per annum respectively, leaving a balance to be carried forward of £6079. Coal (including oil and sundries) cost £207,508, an increase of £8541. Other

manufacturing charges were £79,135, an increase of £1003. Distribution charges were £72,605, an increase of £9423. Management and sundry charges were £25,029, an increase of £1629. Sundry charges cost £6310, an increase of £618. Turning to the items of revenue, gas yielded £322,302, an increase of £25,153. The quantity sold was 3,531,098,000 cubic feet, compared with 3,290,613,000 feet, an increase of 240,485,000 feet, which was the largest increased quantity sold in one year in the history of the Company. Of this increase, 96,864,000 cubic feet, or 2·94 per cent., was obtained in the first half year; and 143,621,000 feet, or 4·37 per cent., in the second half. The total sales in 1913 exceeded all previous records; and those of 1914 beat that record by 240,500,000 cubic feet, or 7·31 per cent. The principal causes contributing to the increased sales were the larger number of consumers and the increased consumption due to the full employment in the works of the district during the whole of the past year, more especially since the commencement of the war. Residuals had yielded £127,435, a decrease of £31,519. This was the least satisfactory item in the accounts; but it was due to circumstances beyond their control. The markets for residuals had commenced to decline in 1913, and continued to do so during the first half of 1914. At the commencement of the second half of the year, there were distinct signs of improvement; but from the declaration of war in August, the downward course again set in, and with increased rapidity. The decline in revenue from this source to June, as compared with 1913, was £11,350, and in the second half year £20,169, notwithstanding the increased consumption of gas during each of these periods. The gross profit had been £95,652, a decrease of £24,348. The erection of the second instalment of vertical retorts had been decided upon. The contract provided for one-half of the work being ready for use in the autumn of last year, and the remainder in the autumn of this year. They trusted that the whole of the reconstructed plant, with a total gas-making capacity of 5 million cubic feet per day, would be in use in the autumn of this year. The results of the working of the first instalment, which had been in use since early in 1913, had been quite satisfactory. The Directors, having carefully considered the position, decided in November to raise the price of gas from 2s. 1d. to 2s. 3d. per 1000 cubic feet, from the readings of the meters in December last. The continued high price of coal and the declining yield from residuals after the declaration of war rendered this step necessary. During the last three years of increasing price of coal, many gas undertakings had found it necessary to increase the price of gas; but satisfactory revenues from the sale of residuals and increased gas consumption rendered it unnecessary in their case. The step had been very reluctantly taken by the Directors; and he trusted that circumstances would before long allow them to reduce the charge. He must not conclude without saying a few words as to the admirable response to the call to the Colours by the employees of the Company. The number that had so far responded was 345, which was nearly 19 per cent. of the whole of the males in the service of the Company. The employees left at home were contributing generously to various public relief funds, and had also provided a fund for the benefit of their own dependants, and formed a Visiting Committee, including several ladies, for the purpose of (if necessary) helping them out of difficulties during the absence of the breadwinner. The Company guaranteed re-employment to every employee upon his return, and paid full salary or wages, less the amount of the Government allowance.

The resolution was carried unanimously without discussion; and dividends were declared at the rates of 4 per cent. per annum on the preference stock and 4½ per cent. per annum on the ordinary stock. Pleasure was expressed that the Chairman was still with them, in good spirits and good health; and a vote of thanks to him concluded the proceedings.

BRISTOL GAS COMPANY.

The Annual General Meeting of this Company was held last Thursday—Mr. FENWICK RICHARDS, the Chairman, presiding.

The Directors, in their report, stated that the income from the sale of gas last year was satisfactory; but that, as in the case of other gas undertakings, the price obtained for residuals was very low and disappointing. The accounts accompanying the report showed that the revenue amounted to £398,878, and the expenditure to £326,886; leaving a balance of £71,992 to go to the profit and loss account. The balance applicable to dividend was £105,659; and the Directors recommended a payment at the rate of 5 per cent. per annum for the half year ended the 31st of December. This would leave £73,472 to be carried forward; and the Directors considered that, under all the unfavourable circumstances, the accounts were satisfactory.

The CHAIRMAN, in moving the adoption of the report, said that during the whole of the year 1914 the Company had to pay a high price for coal, and had had to sell residuals at a low figure, which had not been paralleled for a good many years. Dealing with the year's trading, in comparison with 1913, he said that, as to the carbonizing of coal, there had been a decrease of 12,776 tons. The figures were 241,471 tons, against 254,247 tons in 1913. They had used a little more oil (1,532,845 gallons, against 1,062,003 gallons in 1913—an increase of 470,842 gallons), and had spent for it £1700 additional. In 1913, however, they used a very small proportion of oil, because the price was practically prohibitive. The wages bill was a fair average. As to the distribution of gas, they had sold 2887 million cubic feet, compared with 2760 million cubic feet—an increase of 127 millions. The public lamps and the management expenses were practically the same; but rates and taxes were slightly on the increase. On the credit side of the accounts the sale of gas was very satisfactory. In 1913 private consumers paid £248,000, and last year £261,000; so that there was a gain of several thousand pounds. This was one of the most satisfactory items in the whole of the accounts, and showed that gas was still progressing. The increase on the year was 4 per cent.; and he was happy to state that this was above the average. Lighting and repairs were very similar. There was an increase in the rental of meters, and an increase in the prepayment meters and cooking-stoves. During the year the total number of meters in use increased by 2125 (65,157, against 63,032), the prepayment meters by 1602 (30,673, against 29,071), and cooking-stoves on hire by 2556 (53.806, against 51,250). The mains laid were 2¾ miles; making the total 377¾ miles, against 375 miles before. Residual products were a weak feature in the accounts; but this was entirely beyond control. All the gas companies in the country had had difficulty in selling their residuals during the past year. In comparing some of the accounts he had seen, he found that the Bristol Company were the most fortunate but one, where they had rather less oil than was used at Bristol. The Company stood in a very good position in this matter—bad as this might be. They would have sold a little more coke had it not been for the war. The War Office had commandeered one-third of their horses, and about an equal proportion of the horses belonging to the contractor who helped in the coke hauling. The consequence was that they had not had enough horses to deliver all the coke they had.

The DEPUTY-CHAIRMAN (Mr. J. H. Howell) seconded the motion, and it was adopted.

The retiring Directors (Messrs. G. E. Davies and Fenwick Richards) were re-elected; and Mr. Wilfrid Grace was appointed an Auditor in place of his father, who retired.

The dividend recommended was declared.

DERBY GAS COMPANY.

Although a substantial diminution in the receipts from residuals had to be recorded at the ninety-fifth annual meeting of the Derby Gas Light and Coke Company, held last Friday, under the presidency of Mr. G. GASCOYNE, J.P., the financial statement in other respects indicated eminently satisfactory results.

The CHAIRMAN, in moving the adoption of the report, said that the difficult and troublous times through which they were passing naturally imposed considerable anxiety upon the Directors, especially as it might be found they were far from the end of a difficult and costly war. But on this occasion they could lay before the shareholders a very satisfactory statement of accounts, although in some respects the results were not quite equal to those of the last one or two years. As usual, in the revenue account the chief item on the expenditure side was represented by coal. The amount which had been paid for coal had increased, partly owing to the higher price and partly to their having had to purchase a greater quantity for carbonization to produce the much larger quantity of gas required. The coal bill of the Company for the year amounted to £63,400; and for this cost they had produced and sold very nearly 1,100,000,000 cubic feet of gas. Although the Company maintained the name of the Derby Gas Company, it included within its operations also the extensive gas-works at Belper, and comprised within its area and supplied all the gas required for the large industrial district extending from beyond Belper on the north to Aston-on-Trent on the south, and from Ockbrook and Borrowash on the east to Hilton on the west, as also the town of Derby and the Midland Railway Works. The regular and adequate supply of coal was a perplexing problem at the present moment; and the Directors had purchased additional railway waggons in order to ensure a more regular supply. The market value of residuals had decreased considerably, probably owing to the war. He was certain that the action of the Directors would meet with the approval of the shareholders in voting £500 to the Prince of Wales' National Relief Fund. The muster roll of men from the office staff and from the various workshops who had joined the Colours was the very gratifying number of 73. Some of them were now serving in the Regular Army, and a great many more in the Territorial Force. Arrangements had been made whereby at the end of the war all the places of those who came back would be open to them. Suitable provision had also been made for the wives and families of married men who were serving; and the single men would also have full consideration upon their return. He desired to express the thanks of the Company to the staff and workmen who were left behind, for doing their utmost to maintain the works in full swing in the absence of the men on military duty. They all recognized also to the fullest extent the generous contributions from the employees which was made weekly in the offices and workshops and handed to the Mayor of Derby for transmission to the Prince of Wales' Fund. These contributions already amounted to more than £120.

Alderman NEWBOLD, in seconding the resolution, said he thought the balance-sheet showed that the prosperity of the undertaking had been well maintained. There had been an increase in the sale of gas during the year to the extent of 32 million cubic feet. The reserve fund had been increased by £1100, and now stood at £36,669. During the year 1000 new customers had been added to the Company's books; the total at present being 32,200. The receipts from the sale of gas showed an increase of nearly £5000; but those from residuals had been extremely disappointing, showing a total decrease of £8200.

The report was adopted, and a resolution passed in regard to the declaration of the usual dividends. The retiring Directors (Messrs. Harvey Whiston and W. Hart) being re-elected and Mr. Jacob Smith, one of the retiring Auditors, re-appointed.

Mr. J. HUNTER, in moving a vote of thanks to the Directors and staff, said that Belper people were able to appreciate the advantage of being under the Derby Company.

Alderman NEWBOLD replied on behalf of the Directors, and Mr. J. FERGUSON BELL (the Engineer) for the staff; the latter expressing the opinion that, despite the anxious period through which all classes of industry were passing, the prosperity of the Company would be maintained. One-fifth of the entire staff had joined the Colours, which meant extra work for those who remained.

Increase in Price at Limerick.—Notice has been given by the Limerick Gas Committee that, in consequence of the increased cost of coal, the price of gas will be raised from 3s. 4d. to 3s. 8d. per 1000 cubic feet.

SOUTH SHIELDS GAS COMPANY.

The Annual General Meeting of this Company was held last Thursday—Mr. JAMES READHEAD, J.P. (the Chairman), presiding.

In the report submitted by the Directors, they stated that the sale of gas had exceeded all previous records—viz., 599 million cubic feet; being an increase of 39 millions, or 7 per cent., on the previous year. The reconstruction of the Jarrow works had been pressed forward; and gas was being made with the new plant. The accounts showed that the revenue was £110,234, and the expenditure £87,945; leaving a balance of £22,289 to go to the profit and loss account. There was an increase of £4061 in the revenue from the sale of gas; but against this there was a drop of £5938 in the receipts for residuals. Adding to the £22,289 a sum of £93 received for interest and £19,271 brought forward, there was produced a total of £41,653, which the Directors proposed to apportion as follows: Year's dividend on consolidated and new stocks at 8½ per cent. per annum (less income-tax), £16,459; do. on ordinary stock at 5¾ per cent. per annum (less income-tax), £796; year's interest on mortgages, &c., £3834—total, £21,089. This would leave a balance of £20,564 to be carried forward.

The CHAIRMAN, in moving the adoption of the report, said they might all congratulate themselves on having passed through very strenuous times with such satisfactory results, so far as the shareholders of the Company were concerned. They were fortunately one of the gas companies that had not had to increase their price, so that up to the present time the war risks they had been compelled to take had not cost the public any more money. Notwithstanding the complications which had existed during the past half year, by reason of the war, the revenue account showed that the income was £110,234 against an expenditure of £87,945; and the profit on the year's working £22,289—sufficient to pay interest and the statutory dividends, also to enable them to carry forward £1292. Coal and oil had cost £544 more than in the previous year. The reserves of the Company, which were now substantial, remained intact; and as several other companies had had to draw on theirs, and increase the price of gas, the present year would necessitate the consideration of the Company's price. The most pleasing feature was the revenue from their main commodity—gas. This showed an increase of £4061 over 1913, due to the increased quantity of gas sold; being 39 million cubic feet, or about 7 per cent. The total quantity of gas sold during the year constituted a record of records; in no year since 1890—that is, 24 years ago—had there been such an increase. Against this there was a serious decrease of £5938 from residuals, and a serious increase in the cost of materials generally; while the wages paid to the workmen—£26,292—was an increase of £2387 over the previous year. The coal purchased for the second half of the year was a little cheaper than that used in the first half; but the total cost for the year was more than in 1913, and the price for the next contracts would have a material bearing on the charge for gas. Though the outbreak of the war interfered with the progress of the constructional work at Jarrow, gas making was actually commenced, with such portions of the new plant as were then completed, in October last, and had continued ever since; but the extension scheme was not nearly completed. All the gas at Jarrow was now being made by vertical retorts; the old-fashioned horizontal retorts having been abandoned and partly demolished. In conclusion, the Chairman offered a few remarks on the advantages of gas coke for kitchen fires.

The VICE CHAIRMAN (Mr. Thomas W. Wallis) seconded the motion; and it was carried.

It was then decided that a dividend of 4¼ per cent. for the half year, making 8½ per cent. for the year, on the consolidated and new stocks, and one equal to 5¾ per cent. for the year on the ordinary stock, should be declared.

SCARBOROUGH GAS COMPANY.

The Annual Meeting of the Scarborough Gas Company was presided over by Mr. W. S. Rowntree, who, in moving the adoption of the Directors' report [noticed on p. 336 of the "JOURNAL" for the 9th inst.], said he wished to allude to the very serious loss the Company had sustained during the year by the death of the late Manager and Secretary, Mr. Alexander Allan. Mr. Allan was not only one of the most able gas engineers in the kingdom, but his high character and personal charm endeared him to all whom he met; and not only the Directors and shareholders, but the customers and employees of the Company, had in him a personal friend who was devoted to their interests. The Directors were glad that they felt no hesitation in appointing Mr. Philip Allan to succeed to the vacant position. Trained under his father's eye, and having also acquired experience in London, he had been for two years, as Assistant Manager and Secretary, his father's right-hand man, and familiar with all his methods. They confidently anticipated that he would carry on the best traditions of the Company. It was creditable to him and to Mr. J. F. Smith, their efficient Works Superintendent, that the manufacturing results of the last six months—a peculiarly difficult time—compared favourably with any that had gone before. Turning to the accounts, the total expenditure was £41,717, compared with £41,759 for the previous year, a decrease of £42. The total receipts were down to the extent of £3016. Decreased sales of gas accounted for £1688, and residuals were £1526 less. Very little explanation was needed to account for the decrease in gas sold. About one-quarter of it was due to public lighting. The number of lamps lighted since the outbreak of the war had varied from the whole number to *nil;* but at present about one-quarter were lighted, to 10.30 only. The remainder of the decrease was due to domestic consumption. As pointed out in the report, about 6½ million cubic feet, to a value of some £700, would be recovered when the meters in the closed houses were read. The decrease was wholly confined to the public lighting and quarterly consumers; the remarkable fact being that monthly, and especially prepayment, consumers showed a very gratifying increase for the year. The last six months of the year had been a very anxious time for most gas companies; and the effects of the war could be traced in various items in the balance-sheet. For instance, insurance had increased from £137 to £416. It was thought advisable to insure the Company's property at Lloyd's against all war risks; and a proportion of the twelve months' premium paid had been charged under this heading. As could only be expected, bad debts had also increased. There was a sufficient balance to pay the usual dividends, and leave a carry-forward of £66. The reserve account (a most valuable asset at this particular time) was therefore left intact. Of their employees, 21 had joined the Colours, and allowances to the extent of £600 per annum were being made to their families and dependants; while single men would receive a bonus on their return. Further, all their places would be kept open for them. He was pleased to say that their coal deliveries had been quite satisfactory in every respect. In reviewing the results for the past year, practically one-half of which covered a period of unparalleled disorganization, they would agree that there was cause to be thankful that the accounts had turned out so well. He looked forward to the future of the Company with confidence, feeling sure that the resources they had accumulated in the past would carry them safely through the present trial.

After the report had been adopted, a dividend at the rate of 5 per cent. was declared. Dr. Thorp, acknowledging his re-election as a Director, referred to the magnificent advertisement Scarborough had had. He said the town was probably the best known watering-place in the United Kingdom. Illustrations of it had appeared all over the civilized world. After the war was over, Scarborough should have such years and such successful seasons as it had never had before.

PRICE OF GAS IN BIRMINGHAM.

A Possible Increase.

The question of the price of gas was considered at a special meeting of the Birmingham Corporation Gas Committee which was held last Tuesday under the chairmanship of Alderman Sir Hallewell Rogers. In connection with the matter, the following statement appeared in the "Birmingham Post."

At the present time, the consumption of gas in Birmingham is very much higher than it was a year ago; but the net income of the department is considerably below the average, owing to various circumstances beyond the control of the Committee. For instance, the price of gas is cheap in this city compared with many other places as far removed from the coalfields as Birmingham. Four years ago, the price to private consumers was reduced from 2s. 1d. per 1000 cubic feet to 1s. 11d.; and it has remained at this figure, notwithstanding that in London and several provincial towns it was found necessary to advance the price shortly after the outbreak of war.

Now that the financial year is drawing to a close—it terminates on March 31—the Committee are seriously considering their position; and at yesterday's meeting the departmental prospects were fully reviewed. This was desirable, because of the fact that in the spring it will be necessary to place fresh contracts for coal; and the movements of the market have to be watched with the greatest care. There is every probability that these contracts can only be placed at an advanced rate; and however small this advance may be, the net result will amount to a considerable sum of money. Then it must be remembered that, while the output of gas has been greater, there has been a heavy decrease in the income from residuals during the current year, without the prospect of an improvement during the twelve months commencing April 1 next. Besides this, the department are charged with about £16,000 a year in respect of allowances to dependants of employees serving with the forces. As the income of the department is lower through the increased expenditure, the Gas Committee, as already stated, will not be in a position to contribute this year more than a third of the amount they used to hand over in reduction of the rates; and it is expected that the contribution will not be more than £25,000, as compared with £65,000 last year and £77,000 the year before.

If the Gas Committee are to continue their annual contribution to the rates at a reasonable figure, then it is believed it will be incumbent on them to advance the price to consumers. It has been suggested that a return should be made from 1s. 11d. per 1000 cubic feet to 2s. 1d. for private consumers, and also that the cost to large consumers should be proportionately advanced. The Committee, however, after discussing the subject for a long time, arrived at no definite conclusion; and the matter was adjourned to a future meeting. Meanwhile, an effort will be made to ascertain what financial difference the new coal contracts will involve, and what is likely to happen in regard to the sale of residuals. The prospect is by no means favourable; and the probabilities are that the increased expenditure will be eventually met by a revision of the present basis of prices to all consumers.

Wandsworth, Wimbledon, and Epsom Gas Company.—At the half-yearly meeting of the proprietors to-day, the Directors will report that the revenue account for the six months ended Dec. 31 shows a profit of £26,415. After providing for the interest on the debenture bonds and stock and on deposits and loans, there remains to the credit of the profit and loss (net revenue) account, with the addition of the balance brought forward and an amount appropriated from the special purposes fund, &c., the sum of £30,546 available for payment of dividends. The Directors therefore recommend that dividends be declared at the statutory rates as follows: On the Wandsworth "A" stock, £8 7s. 6d.; on the Wandsworth "B" stock, £6 17s. 6d.; on the Wandsworth "C" stock, £5 17s. 3d.; on the Wimbledon stock, £6 5s.; on the Epsom stock, £6 17s. 6d.; and on the new ordinary stock, £5 17s. 3d. per cent. per annum. The dividends on the Wimbledon and Epsom stocks are increased by 2s. 6d. and 5s. per cent. per annum respectively, due to the reduction in the price of gas. The sale of gas in the half year shows a small increase of 0·8 per cent. over the corresponding period of 1913.

CONSOLIDATED GAS COMPANY OF NEW YORK.

Annual Report.

The following is the report of the New York Consolidated Gas Company for the year ended Dec. 31, which was submitted at the meeting on the 25th ult. As usual, it furnishes a detailed account of the scope of the Company's activities, and presents a striking contrast to the meagre reports submitted by the Directors of many English gas undertakings. The following are some extracts from the document.

The report is preceded by the following condensed statement of the Company's assets and liabilities on Dec. 31.

Assets.

Fixed assets, including land, plant, and equipment	$54,242,210
Bonds and stocks of, and advances to, affiliated Companies, and other investments	101,391,708
Bonds and mortgages	200,000
Cash	2,751,125
Accounts receivable	2,446,771
Materials and supplies	970,590
Total	$162,002,404

Liabilities.

Capital stock	$99,816,500
Debentures and notes	14,236,525
Accounts payable and accrued charges	7,011,760
Stock and bond premiums	13,951,397
Renewal and reserve fund	11,359,312
Profit and loss	15,626,910
Total	$162,002,404

The figures thus far available respecting the Company's operations for the calendar year 1914 indicate that the earnings from the gas business during the year (after deducting the reserve for renewals and contingencies) amounted to $1,010,035. For the purpose of determining the earnings applicable (in accordance with the decision of the United States Supreme Court) to the value of the tangible and intangible property ($80,116,039) employed in the Company's gas business, there should be added the surplus earnings of the Astoria Light, Heat, and Power Company ($1,127,886); making the total earnings from the gas business for the past year $2,137,921. This amount is equivalent to 2·67 per cent. on the above-stated value of the tangible and intangible property employed in the manufacture and distribution of all gas sold by the Company.

Dividends were paid during the year on the capital stock aggregating 6 per cent., and amounting to $5,988,990. The dividends and interest received on stocks and bonds owned and advances made to affiliated gas and electric companies operating in the boroughs of Manhattan, Queens, and the Bronx, and the County of Westchester (excluding interest and dividends received from the Astoria Light, Heat, and Power Company as above, amounted to $5,808,716. The interest paid during the year on funded and other debt amounted to $826,956. The surplus (including that of the Astoria Company) carried to the profit and loss account for 1914 amounted to $1,130,691.

Company's Recent Financing.

In the spring of 1913 it was realized that additional funds would be needed in order to finance the obligations and requirements of the Company and the affiliated gas and electric companies; and it was decided that these funds should be raised by the issue of $25,000,000 of capital stock of the Company. It was determined, however, that the New York Edison Company and the Astoria Light, Heat, and Power Company should, in the first instance, fund their temporary obligations to the Consolidated Company, aggregating $30,000,000, and that the Astoria Company should pay off their only outstanding mortgage bonds, amounting to $375,000, held by the Consolidated Company, and cancel the mortgage securing the same. Application was made to the Public Service Commission of the First District on July 13, 1913, by the New York Edison Company for authority to issue at par $15,800,000 of capital stock, and to use the proceeds in refunding their notes for a corresponding amount; and by the Astoria Company for authority to issue at par $9,500,000 of capital stock and $5,000,000 first mortgage fifty-year 5½ per cent. gold coupon bonds, the proceeds of the issue to be used to refund $14,200,000 of their notes and $375,000 of their first mortgage bonds at 80 per cent. (the balance, $75,000, to be refunded with cash out of the treasury). Application was also made to the Commission by the Consolidated Company for authority to purchase at par the foregoing issues of stock and bonds when authorized. Hearings were held upon the foregoing applications; and on May 4, 1914, after a lapse of more than nine months, the Commission gave their consent to the proposed issues, and also to the purchase thereof by the Consolidated Company.

At a special meeting of the Board of Trustees of the Company on May 8, 1914, a resolution was adopted providing for the calling of a special meeting of the stockholders for the purpose of voting upon a proposition to increase the Company's capital stock from $100,000,000 to $125,000,000 par value, and providing that, upon this being authorized by them and approved by the Public Service Commission, an issue be made forthwith of $25,000,000 of convertible debentures. The Company duly filed an application with the Commission for authority to issue the stock and debentures, and the hearing took place on the 2nd of June. On the 1st of December, after a lapse of six months, the Commission authorized the issue; and the officers of the Company were directed to offer the stockholders the privilege of subscribing for the debentures to the extent of 25 per cent. of their holdings of stock.

Alterations in Works and Plant.

A portion of the Company's plant taken by the City authorities for the improvement of the north river front has been dismantled, and the apparatus sold as scrap. Several buildings, however, which were in fairly good condition, were left standing. There remained four gas-holders, which were old and small, and did not give sufficient pressure for modern requirements. Early last September the Company began to demolish them, and to fill up the brick tanks with surplus material. The following month a new coke screening and sizing plant, equipped with devices for the rapid loading of trucks and for measuring and bagging coke for the retail trade having a capacity of 1000 chaldrons, was put in operation. Although it has been running for only a short time, it has already demonstrated its superiority over any method of handling coke.

During the year there was constructed a new barge for transporting coke from the Astoria plant and unloading it at the several delivery points in New York City. The boat is of a new design, and is equipped with rapid unloading mechanism of an improved pattern. It was put in operation in the latter part of October, and a material decrease in coke breakage has resulted.

The new tunnel between Astoria and the Bronx is finally completed.* It is lined throughout with concrete, and reinforced with a metal lining for a distance of 452 feet through the faulty seam, to which reference was made in our last annual report. The installation in the tunnel of two 72-inch gas-mains is now under way.

Oil Supply.

The increase of 1·8 c. per gallon in the price of gas oil, due to the shortage in the supply of petroleum products referred to in the last annual report, was effective during only the first six months of 1914. As it seemed to the officers that the danger of a serious shortage had passed, and that the supply would be ample for both present and future requirement, the Company negotiated a new oil contract on July 1, 1914, at a reduction of 2 c. per gallon for the period terminating Dec. 31, 1916, and thereupon obtained a cancellation of the old contract, which then had six months to run.

Sale of Bye-Products.

During the first half of 1914, the market for residuals, with the one exception of coke, was variable and depressed. The revenue the Company receive from them is in every case based upon the market price of the products derived from them. Coal tar is sold upon the basis of the average market price of pitch and dead oil; ammoniacal liquor, upon the average market price of sulphate of ammonia; and cyanogen press cake, upon the average market price of yellow prussiate of potash. The duty upon all these products of coal gas manufacture was materially reduced by the tariff of 1913, with the result that foreign goods were immediately thrown on the market at considerably reduced prices, which were maintained until importations were stopped by the breaking-out of the war in Europe. Prices then advanced and continued higher during the second half of the year.

An increased quantity of these residuals was produced during the first half of the year, because the threatened scarcity of gas oil made necessary the manufacture of a larger amount of coal gas. In July, however, conditions changed, and the relative proportions of coal and water gas theretofore manufactured were re-established, and have since remained normal.

The existing contracts for the coal tar and ammoniacal liquor produced have five-and-a-half years to run. Such sulphate of ammonia as the Company produces is sold as ordered, and received by the purchaser at market prices without contract. The three-year contract for cyanogen press cake expired on Dec. 31, and was recently renewed for a further term of three years from Jan. 1. In some of its conditions, the new contract is more favourable than the previous one.

The production of coke has been somewhat in excess of 1913, owing to the increased manufacture of coal gas. Notwithstanding the fact that the coke is much better prepared in the new plant than heretofore, much effort is required to dispose of it, as the market is very unsteady. One difficulty which has been encountered, and which the Company are endeavouring to overcome, is the excessive amount of small coke caused by breakage in handling. Many contractors and others, who were formerly large users of coke, are now employing electric power—thus doing away with boilers and engines, and cutting-off an outlet for coke, upon which dependence was placed in the past. The Company are using large quantities of surplus coke as fuel in the water-gas generators, in place of the anthracite coal formerly employed. While this reduces the capacity of the generators to some extent, the loss thus sustained is more than set off by the lower cost of coke as generator fuel and the higher price thus obtained for the remaining coke sold.

From the water-gas stations oil tar and holder or drip oil are produced. With oil tar the Company are in competition with fuel oil, which is produced in large quantities by the petroleum refineries. Contracts for some of the Company's material have been made; but the entire production cannot be disposed of. The surplus is used for fuel under the boilers for generating steam.

There has been some demand recently for holder or drip oil, for which higher prices are obtained than for the oil tar, and a contract has been recently made for a limited quantity. Inquiries are frequent, however; and it is expected that a broader market for this residual will soon be obtained.

Quite a quantity of spent oxide used for purification was disposed of during the year; but the market is very limited and uncertain. What could not be sold has been used for filling-in and making land behind the docks and in the low swamp areas at Astoria.

Progress was made during the year towards the perfecting of the process for briquetting.

New Office Building.

Besides the Consolidated Company, the following of the affiliated companies, are now located in the new general office building in† Fifteenth Street: The New Amsterdam Gas Company occupy a portion of the ground floor with their commercial department and a portion of the second floor with the administrative and general offices, The Standard Gas Light Company, the Municipal Lighting Company, and

* An illustrated description of the tunnel will be found in the "JOURNAL" for Aug. 5, 1913 (p. 363).

† An illustrated description of this building was given in the "JOURNAL" for Feb. 17, 1914 (p. 426).

the National Coke and Coal Company, with their various departments, occupy the remainder of this floor. The Astoria Light, Heat, and Power Company have offices on the sixteenth floor. The New York Edison Company have a show-room on the ground floor, and occupy several of the upper floors of the building. The United Electric Light and Power Company occupy the sixth floor. The Consolidated Company occupy space on the ground floor for their commercial department and for an appliance display room. Their display of industrial appliances is in a portion of the basement. The administrative and engineering departments occupy the twelfth, sixteenth, and seventeenth floors of the building.

The advantage to the Consolidated Company and to all the affiliated companies of having their officers and employees brought into closer and daily contact with each other, thus facilitating the transaction of inter-company business, has already been very marked. About 2000 persons connected with the various Companies are now accommodated in the building.

The restaurant for employees was started on the 6th of July. The gas and electric kitchens and dining-rooms occupy the entire roof house area on the nineteenth floor of the building. The employees, to whom an average of 1167 meals per day have been served since the restaurant was opened, receive a good substantial luncheon at a very moderate price. The kitchens, in which the most modern appliances have been installed, are available also for demonstrating on a large scale the use of both gas and electricity for cooking. Hotel and restaurant managers are given the opportunity on Saturdays, when lunch is omitted, of examining the appliances and equipment.

The auditorium, in which the annual meeting of stockholders is held, is available for meetings of the various societies and associations, technical and otherwise, of the employees of the companies, as well as for the various educational undertakings alluded to elsewhere.

As an additional precaution for the safety of employees in the building, fire drills are conducted under the supervision of the Fire Prevention Engineering Bureau. Its representative makes weekly inspections of the fire-extinguishing and fire-escape equipment.

A large illuminated display sign is in process of erection on the roof of the building, and is nearly completed. Its dimensions are 254 feet in length and 38 feet in height; and it will be placed 25 feet above the roof. The sign will read, in letters 15 feet high, "Gas and Electric," and in letters 12 feet high, "Light, Heat, Power." The letters will be illuminated at night by 3916 lamps; and it has been estimated that it will be distinctly readable for five miles in either a northerly or a southerly direction.

Employees' Welfare and Education.

The educational work, which was inaugurated two years ago for the benefit of the accountants, bookkeepers, and clerks of the Consolidated and the affiliated Companies has been continued with gratifying results. Two classes are now maintained—the junior class devoting their time to the study of the fundamental principles of bookkeeping; while the other and advanced class study the elements of accountancy. Both of these courses are well attended, and are proving of great benefit to the employees.

During the year there was organized a "Gas Accountants' Society," composed of the accounting officers of all the gas companies. This organization will be of great assistance in preserving uniformity in accounting methods and facilitating the discharge of the duties imposed upon the accounting departments of the several companies.

In the effort to assist in the educational betterment of the employees, the Company have for several years encouraged them to participate in the educational courses, conducted by one of the prominent National Gas Associations. During the past year a greater number of employees have availed themselves of this systematic instruction than ever before; and there are now enrolled 270, consisting principally of those engaged in the sale, installation, and maintenance of gas appliances. The companies pay the cost of tuition of their own employees. The instruction consists of a correspondence course, supplemented by class meetings, at which, under the direction of a class leader, the lessons are discussed and amplified. The instruction for the past year related to the "Utilization of Gas and Gas Appliances," and the interest shown was most gratifying. Not only have the employees applied themselves faithfully to the study of these subjects, but the character of their work shows marked improvement, and fully justifies the existence of this educational course, from which they derive benefit, in which the companies naturally share. By aiding employees with educational opportunities of this character, a definite advantage is gained through the improvement in the service rendered to the public.

Promotion of Gas for Industrial Purposes.

The importance of promoting the sale of gas for industrial purposes has led the Company to supplement their previous efforts in this connection by undertaking the development of a more efficient selling organization to deal with this class of business. Accordingly, a special class in industrial gas appliance salesmanship was recently formed, to be conducted independently of any other educational movement. The class consists principally of employees of the commercial and fitting departments, though any one who may have an aptitude or desire for this class of work may participate. Under a competent leader, two sessions of the class are held each week. The method of instruction consists of the demonstration of appliances, the distribution to the students of written lessons, their discussion and explanation, and written examinations and also practical instruction in the operation of industrial gas appliances. There are 140 employees availing themselves of this course: and it is believed that thereby there will be developed many more high-grade industrial gas salesmen, qualified to cope with the diversified problems which this class of industrial business presents. Such an efficient selling organization must necessarily result in a material increase in the use of gas.

Both the photometrical and general appliance divisions of the laboratory of the Department of Utilization, located in the building of the Standard Gas Light Company are now in active operation. The utilization department has been actively engaged in the testing, examination, and development of gas-consuming devices and appliances for illumination and for domestic, commercial, and industrial uses. Its efforts have resulted in a marked improvement in the character of the appliances offered by the Company for the use of their customers.

From time to time the Company adopt for exploitation those appliances which the Department of Utilization, after careful investigation, has found to be the most economical in operation and satisfactory for the consumers' use. Approximately, 28,000 of the new "Peerless" ranges are now in use; and these efficient appliances, which which have been designed by the Company. and are made from their own patterns, are giving great satisfaction.

Seeking New Uses for Gas.

In addition to its activities in promoting the utilization of gas by improving existing methods and appliances, the Department of Utilization has in hand a number of investigations, the object of which is the application of gas to new uses and the development of appliances or methods for such purposes. In order to ensure the utmost efficiency in the service rendered by the larger types of gas-ranges installed in hotel and restaurant kitchens, and by the larger types of industrial units, a corps of inspectors is maintained for the purpose of making periodical examinations of these installations. During the past year 17,214 such inspections were made. Instructions in the use of domestic appliances were given to 71,810 customers during the year by 25 women demonstrators.

In the model apartment in East Forty-Second Street, demonstrations are given in cooking and in the most effective employment of gas for other domestic purposes, including illumination. Special days are set aside for demonstrations for the benefit of the pupils of girls' high schools, members of women's clubs, and similar asscciations.

In the new headquarters of the National Housewives' League, which has a membership of over 75,000 in Manhattan and the Bronx, space has been rented for a model gas kitchen, in which the most modern domestic appliances have been installed. An experienced demonstrator is always in attendance, and gives exhibitions of baking, roasting, and broiling on the gas-range.

There is a growing demand for water-heaters, as well as for portable room-heaters; and there was an increase of approximately 40 per cent. in the sales of these appliances in 1914 as compared with 1913. An important development in the heating of stores, offices, and houses has been made by the adoption of the gas-fired steam radiators, upwards of 500 of which were installed during the year. The gas companies installed 157,410 and brought in 95,840 appliances—a net increase of 61,570. The Consolidated and the affiliated gas companies have out on rental 409,061 cooking appliances of various types.

The campaign referred to in the last annual report—having for its object the substitution of modern efficient lighting equipment for inferior types of burners—was concluded on March 7, 1914, and resulted in the sale and installation of 91,558 incandescent gas-lamps. An inspection which is being made to determine the present status of these lamps indicates that most of them are still in use.

Day and Night Output of Gas.

The output of gas in the night period in the boroughs of Manhattan and the Bronx and in Long Island City in 1914 was about 700 million cubic feet less than in 1912, and was the same as in 1909. This indicates that during the period of five years there has been no increase in the night output. The day output, on the other hand, has increased 1000 million cubic feet since 1912, and 3200 million cubic feet since 1909. The total increase in the day and night output in the territory referred to during the five years ending Dec. 31, 1914, amounted to 12 per cent. The day output alone increased approximately 29 per cent. During this period of five years the number of meters in use in this territory increased from 731,825 to 839,386. The gas supplied through the additional 107,561 meters at night served, therefore, only to offset the loss in the night consumption due to the substitution of electricity for gas; thus enabling the companies supplying this territory to hold their own in the night output. The increase in the day output reflects the development in the use of gas in the daytime for domestic, commercial, and industrial purposes, and emphasizes the importance of employing every possible means to promote the use of gas for these purposes.

Doubtless many gas-consuming appliances are purchased directly from manufacturers and dealers, and are installed without appearing on the records of the gas companies. Nevertheless some impression can be gathered of the extent to which efforts of the companies have contributed to the results obtained in the way of increased day consumption of gas, from the fact that there has been a net increase of 429,200 in the number of appliances, both rented and sold, during the five-year period.

Use of Automobiles by the Fitting Department.

On Jan. 1, 1914, the fitting department had in service fourteen 1-ton electric trucks. Their operation was successful, and resulted in a material saving in the cartage of stoves, meters, pipe, and fittings, and in the conveyance of fitters to their work. The travelling time of fitters has been reduced by the use of these vehicles, so that fewer men are required than formerly to perform a given amount of work. In August, 1914, thirteen additional 1-ton electric trucks were purchased, which, together with those in service on Jan. 1, were sufficient to perform all the fitting department's transportation, except during extraordinarily busy periods. These 27 trucks have displaced 52 horse-drawn vehicles, 77 horses, and 25 drivers.

Miscellaneous Matters.

During the winter months of 1914 there were three periods when the extremely low temperature resulted in frozen service-pipes and consequent interruptions in the supply of gas, while there were none during the year 1913.

The school of instruction for fitters was in operation throughout the year; the Company using every endeavour to improve the quality of work performed by these employees. During the year 406 employees attended the school, which is so equipped as to show every condition the fitter is likely to find in his ordinary work. This includes everything from indexing and locking and unlocking of meters to the measuring for and the installing of appliances. Special classes are held for

instruction in the installation and adjustment of large commercial and industrial appliances.

The Company employ a trained corps of experts to make investigations of their plants and properties, with the idea of preventing fires and accidents. No fire occurred during the year which caused a loss of more than $500, except in one building, belonging to the Westchester Lighting Company at Tarrytown, which, however, was re-insured. The Company use every known means and device for the prevention of accidents to their employees and the public generally; and with this end in view more than 3500 inspections of the plants and stations of the companies were made during 1914.

The Company continue to maintain their legal aid bureau, through which any employee may secure, without charge, such legal advice as he may require. Many avail themselves of this privilege. The Gas Companies Employees' Mutual Aid Society has a membership of 3800, and is doing good work in helping those who are incapacitated from injuries or illness. Free medical advice is given to all members.

The difficulty of obtaining skilled workmen for the department of mains and services has led to the formation of a school of instruction for the men in this department.

New Subway Extensions and Removal of Mains.

In 1914 the rapid transit subway companies had under construction about 15 miles of subway. This involved the temporary removal of the gas-mains of the various companies along the route, and the construction, wherever necessary, of bye-passes to take the place of such gas-mains as could not be temporarily dispensed with. All this was done under the direction of the Consolidated Company's department of mains and services.

During the year about 14 miles of bye-passes connecting the smaller sizes of gas-mains were installed in street gutters, and more than two miles, connecting the larger sizes, were installed on overhead trestles specially constructed for the purpose.

The five stations of the emergency department are now equipped with eight "Pulmotors." The services of this department are in more frequent demand than ever before, and its value is recognized by the city departments as well as the general public.

Some Statistics.

The municipal street lamps on the lines of the Consolidated Gas Company and the affiliated gas and electric companies on Dec. 31, 1914, consisted of 23,907 incandescent gas-lamps, 6 open-flame lamps, 11,903 electric arc lamps, and 23,250 electric incandescent lamps—a total of 59,066 street lamps. The total number of gas-meters in use at the end of 1914 was 912,884, and of electric meters 290,844.

The combined sales of gas of the various companies during the year were 29,453,618,387 cubic feet—an increase of 0·65 per cent. over the previous year. Sales of electric current in the year amounted to 586,115,080 kilowatt-hours—an increase of 4·79 per cent.

The taxes charged against the earnings of all the companies during the year amounted to $4,322,464.

There was expended during the year, for additions to and extensions of the producing and distributing plants of the various companies, the sum of $7,191,507. At a cost of $4,564,616 for repairs and $3,460,943 for renewals, or a total cost of $8,025,559, all these properties were maintained at the highest possible point of operating efficiency; thus ensuring the best results as to the quality of the gas and electric service, as well as to economy in the cost of the production and distribution of gas and electricity.

THE DYESTUFFS PROBLEM IN AMERICA.

Suggestions for its Solution.

In an article in "American Industries," Mr. Harold L. Allen dealt with the solution of the dyestuffs problem in America. In the course of the article, he made the following remarks.

The Problem Stated.

Prior to the beginning of the European war, it was not generally realized to what extent many industries of the United States are dependent on foreign supplies. We had grown accustomed to think of America as the source of raw materials for European factories, rather than the consumer dependent upon foreign products in a large measure for the maintenance of some of our largest industries—dyes for the textile, leather, and paper trades. Although during the last five years the imports of dyestuffs into the United States have remained practically stationary, owing to the enlargement of the chemical works, we are dependent upon Germany for such great quantities of dyestuffs that the stoppage of imports since the beginning of the war presents a serious problem to the consumers of these commodities.

Figures obtained from official sources show that the total average purchases from abroad of alizarin and other coal-tar colours have been about $10,000,000 annually during the past six years. In 1913 the total value of imported dyestuffs from all foreign countries was $10,395,744, including indigo and aniline salts. Of this amount Germany furnished $8,876,020. Figures for 1913—the last complete year—as previously given, show the imports of foreign artificial dyestuffs to have been $10,395,744; and it is this amount that American manufacturers are now obliged to supply.

The United States must have dyes. These must be either imported or manufactured in America; and since the war has paralyzed the trade of Germany, from whom we obtain by far the largest supply of imported dyes, only one cargo having reached this country since the beginning of hostilities, Yankee ingenuity must come to the rescue. The solution is: "All American dyes for American manufactured goods." We must establish a dye-manufacturing industry in the United States which will supply not only the demands of the home market, but compete successfully with other nations for the dye trade of the world.

Suggested Solution.

In order to build-up an American dye-manufacturing industry that will supply all the demands of the home market and compete successfully with foreign manufacturers for the dye trade of the world, proper support must be given to the industry by both the Government and the consumers. The American manufacturer is able to produce dyes to sell at the same price as, or a lower one than, the German. This circumstance makes it difficult to understand the spirit which prompted American consumers to continue to buy abroad, when equally good home products were offered at reasonable prices. Colours manufactured in the United States and sold in competition with the German product are cheaper in America than the same dyes in Germany; and in many instances the American manufacturer can outbid the German in this country.

The part the Government must play in upbuilding the dye industry is an important one. A sufficiently high tariff must be placed on dyes to insure American manufacturers against the destructive competition of foreign combinations when the war is over. The coal-tar colour industry in the United States makes no plea for protection on the ground of fostering an infant industry; but sufficient protection should be given to prevent America from being made the dumping-ground for the over-production of Germany. Unless this is done, German manufacturers will be in a position to destroy the American coal-tar colour industry when the war is over, exactly as was done in the case of the hydrochinon industry.

The present tariff on finished coal-tar dyes is 30 per cent., at which figure it has been since the days of the Wilson tariff law. The tariff on certain raw materials entering into the production of dyes, however, has been raised during recent years without giving a compensating increase to the finished products. This has greatly militated against American manufacturers, who were thus compelled to pay more for raw material entering into dyes forced to sell in competition with German colours not paying a corresponding increase. Thus it can be seen that if the American dye industry is to be fostered, Government must adopt a permanent amicable attitude toward it.

Of the ability of the United States to supply the raw materials necessary to the manufacture of synthetic colours, there is no question. Though many chemicals enter into the production of the wide varieties of dyes now in use, most of them are coal-tar derivatives. The primary raw materials from which the great majority of constituent elements can be derived are coal tar and heavy acids. These latter are produced in abundant quantity in America at the present time; but there is a surprisingly low production of coal tar, despite the great amount of coke manufactured.

It is highly desirable that the United States should have a flourishing coal-tar industry for other reasons than the manufacture of dyes. Some of the constituent elements of high explosives and smokeless powder are derived from coal tar; and military policy should dictate the fostering of the industry. In addition to these, a great variety of drugs used in medicine are manufactured from coal tar; and a thriving business, similar to the German one, should grow up around the dye industry.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The following resolution has been passed in Glasgow, by representatives of the Corporations of that city, Dundee, and Aberdeen, and of the Edinburgh and Leith Gas Commissioners: "That this conference of gas authorities in Scotland, having considered the replies received from various authorities, and the seriousness of the position created by the inadequate supplies of coal, further resolve to ask the Prime Minister to take immediate steps to provide proper facilities for railway transport in any manner that may be practicable." The Town Clerk of Glasgow has received replies from 23 gas authorities in Scotland approving of the resolution to allow the miners to work more than eight hours per day. These authorities represent 650,000 consumers, and carbonize 1,530,000 tons of coal per annum.

It may be remembered that at the close of the discussion on the coal shortage question by the Dundee Gas Committee on the 9th inst., as reported in last week's "Notes," the motion submitted by the Convener (Mr. Noble), which was the one carried at the Manchester meeting, was adopted; and it was intimated that it might be possible to have a special meeting of the Council to get the matter put through. This the Convener succeeded in doing, and the meeting was held on the 12th inst.—the Council sitting as the Gas Commissioners. Mr. Noble stated that since explaining the matter in Committee there had been certain developments. Various other town councils throughout Scotland had come into line with them, and as a result their position, so far as approaching the Government was concerned, was much stronger now than it was before. They simply wanted to conserve the coal supply for the great gas undertakings—and the little ones as well—by impressing upon the Government the necessity of safeguarding the gas supply, for the simple reason that much of the cooking, heating, and lighting depended on this, and a great many of the industries throughout the country, especially in the West of Scotland and the Midlands of England, were dependent upon gas as a power for the manufacture of munitions of war. He moved approval of the Committee's minute. Treasurer Soutar seconded the motion. Mr. Kinmond moved, as an amendment, that they should add to the motion a clause asking the Government to take into consideration the matter of the price of coal. Coal was not only necessary to Convener Noble, but to every industry. The price was said to be artificially raised. Mr. Scrymgeour seconded the amendment. Mr. Paton questioned the competency of the proposal. He said that the Gas Committee had already fixed contracts. They should give them power to take whatever steps they thought necessary to safeguard their coal supplies for the Gas Department. After further remarks, the motion was carried by 14 votes to 7.

Mr. Alexander Masterton, the Engineer and Manager of the Edinburgh and Leith Gas Commissioners, has issued a circular announcing that the Commissioners have arranged with Mr. J. Lord, the Managing-Director of the Manchester Furnaces, Limited, to deliver a lecture and give practical demonstrations on gas-furnaces, illustrated with limelight views, in the Free Gardeners' Institute, Edinburgh, next

Friday evening. The lecturer will show clearly the advantages of gas as a heating agent for case-hardening, tempering, annealing, forging, melting metals, &c , and will also discuss the question of relative costs. The lecture should prove very interesting.

War risks have been met by the Arbroath Gas Corporation. The works, on the sea coast, are now insured (buildings and contents) for £21,000, against Zeppelins or naval bombardment. The rate is 20s. per cent. on a Lloyds' policy. Improvements have been carried out at the works, and the gas made per ton of coal for the past six months amounted to 10,760 cubic feet—representing an increase of 1006 cubic feet as compared with the previous year.

Two Gas Companies supply the small burgh of Buckhaven, in Fife; and the authorities of the burgh are now negotiating with a view to acquiring the works of the East Wemyss and Buckhaven Gas Company, Limited, and the pipes in the burgh of the other concern—the Leven and Methil Gas Company, Limited.

Operations have been commenced at Forfar with an extension of the gas-works; the contractors being the Woodall-Duckham Company. The necessary Provisional Order has been obtained, and the works will be considerably modernized, with due attention to the recovery of bye-products.

A considerable increase is noted in the use of gas at Dunfermline, particularly during the past year. It is regarded as essential to build twelve additional vertical retorts, to keep pace with the demand. The estimated cost is fully £5000.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 22.

The London market for tar products remains quiet; but as makers are generally well sold in all products except pitch, this condition of things is to be expected. Several manufacturers of pitch prefer to stock the article rather than accept the prices that are indicated, or undertake further freight obligations. The following may be taken as the respective values: Benzol 90 per cent., 1s. 2d. net and naked; 90-160 solvent naphtha, 1s. 6d. net and naked; 60's carbolic acid, 3s. net, casks free; ordinary London creosote, 4 1/16d. to 4 1/8d. net in bulk; pyridine, 8s. 3d. net in buyers' drums; creosote salts, 85s. to 100s. per ton.

Sulphate of ammonia has again advanced for February-March delivery, and £13 12s. 6d. has been offered to, and refused by, a maker for 25 per cent. quality net and naked at producing works.

Tar Products in the Provinces.

Feb. 22.

The markets for tar products have been very quiet during the past week. In benzol, there are a few inquiries, and some sales are reported at fairly good figures. Solvent naphtha is very firm, and high prices have been paid in one or two districts. Heavy naphtha is steady. It is difficult to do business in creosote at the present moment, and stocks seem to be fairly high. Crude carbolic remains firm, and sales are reported at from 2s. 11d. to 3s. per gallon.

The average values during the week were: Value of liquid products in one ton of tar, 17s. to 18s. 6d. Benzol, 90 per cent., naked, North, 9 1/2d. to 10d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. to 2s. 4d. Crude naphtha, in bulk, North, 5 1/2d. to 5 3/4d. Solvent naphtha, naked, North, 1s. 2d to 1s. 3d. Heavy naphtha, naked, North, 11d. to 1s. Creosote, in bulk, North, 3 1/2d. to 3 3/4d. Heavy oils, in bulk, 4d. to 4 1/4d. Carbolic acid, casks included, 60 per cent., East and West coasts, 2s. 10d. to 3s. Naphthalene, £6 to £11; salts, 65s., bags included. Anthracene, "A" quality, 2d. per unit; "B," nominally 3/4d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Feb.* 20.

Throughout the week there has been little animation in the market, and prices at most ports have had a drooping tendency. No relief has been afforded to the situation so far as rail and sea freight facilities are concerned, and this fact has stood in the way of business. Quotations have become rather irregular; but the nearest values at the close are £13 12s. 6d. per ton f.o.b. Hull, £13 13s. 9d. per ton f.o.b. Liverpool, and £13 18s. 9d. per ton f.o.b. Leith. In the forward position, the tone has been quite firm, and it has transpired that several producers have realized £13 per ton f.o.b. at the best ports for July-December delivery.

Nitrate of Soda.

The market for this material continues very firm at 11s. per cwt. for ordinary quality, and 11s. 6d. for refined, on spot.

Sulphate of Ammonia.

From another source it is reported that this market has remained about the same throughout the past week. The shipping of the article creates difficulties, which has probably caused the quietness in the market during the past few days. Outside London, makes are quoted at £13; Hull, £13 15s.; Leith, £14; Liverpool, £14; Middlesbrough, £13 17s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

There is a strong demand for coal; and though the scarcity of steamers makes shipment rather difficult, and stiffens the rate of freights, the supply is good under the circumstances. In the steam coal trade, the prices are irregularly higher, especially for forward delivery. Best Northumbrians are from 16s. to 16s. 6d. per ton f.o.b.; and for delivery over the rest of the year, from 17s. to 18s. per ton has been quoted. Sales, however, are not readily made for large quantities. Second-class steams are about 13s. 9d. per ton for prompt delivery; and for steam smalls, the demand is full at 9s. 6d. to 13s. per ton f.o.b. The output at some of the collieries is kept back by the fewer men at work. In the gas coal trade, the market is steady, though there is now some diminution in the consumption, and it is thought that from some collieries cargoes are now more rapidly sent. For best Durham gas coals for prompt delivery, the quotation is 12s. 6d. to 13s. 3d. per ton f.o.b.; for second-class Durhams, about 11s. 9d. to 12s. per ton; and for "Wear Specials," round about 13s. 3d. to 13s. 9d. per ton. Some contracts for gas coals are in the market; but the high freights impede transactions for any long forward period. As far as can be learned, rather higher figures are being paid—in one case 13s. 6d. per ton has been paid for best Durhams for the latter half of this year. But the chief advance is in steam coals, as shown above. Coke is fairly steady. Good gas coke is from 12s. to 12s. 9d. per ton f.o.b. in the Tyne; the demand for export being a little fuller.

Lighting and Water in Irish Local Taxation.

In the Local Taxation returns for Ireland for the financial year 1913-14, which have just been issued, it is shown that the total amount of profits on lighting undertakings in the hands of town authorities was £30,413, of which £25,413 appertained to gas and £5000 to electric light. Excluding these two sums, the net ordinary expenditure, including charges in respect of borrowed money, of these undertakings amounted to £411,584 and £231,262 respectively; while the receipts amounted to £340,262 and £236,419 respectively. These figures appear to indicate generally that the undertakings are self supporting. The receipts connected with water undertakings in the hands of local bodies are those produced by rates assessed on valuation, and those arising from sales of water, water-rents, &c. The amount of the latter included in the "other receipts" of 1913-14, is £144,448. The sums produced by public and domestic water-rates are included in the amount given as rates; but as they are not always shown separately in the local accounts, it is not possible to determine with strict accuracy the amount produced by each such rate. A careful estimate, however, discloses that of the total amount (£211,025), a sum of £109,192 was for water supplied for domestic and other private purposes; being 3·1 per cent. of the total amount raised as rates during the year.

Wallasey Water Supply.—It is anticipated that in about two months' time Wallasey will be taking nearly 1½ million gallons of Vyrnwy water per day from the Liverpool Corporation; the Finance Committee having agreed to the recommendation of the Water Committee to obtain another 200,000 gallons per day of the Welsh water for admixture with that from the local wells. The quantity to be supplied from the wells will be 1,190,000 gallons per day; and the blend will be 55 per cent. of Vyrnwy and 45 per cent. of Wallasey water.

Huddersfield Gas Committee Chairman's Resignation.—At the meeting of the Huddersfield Town Council last Wednesday, a letter was read from Mr. Rowland Mitchell (the Chairman of the Gas Committee), tendering his resignation as a member of the Council, and forwarding a cheque for £10, as required by the Council's bye-laws. He expressed the desire that, should the Council not accept the cheque, it should be handed to the Belgian Famine Fund. The Council decided, on the motion of the Mayor (Alderman J. Blamires), seconded by Alderman W. H. Jessop—"That the Council record their deep regret at the receipt of Councillor Mitchell's resignation, and their high appreciation of the very able services he has rendered to the Corporation for a period of nearly six years, especially as Vice-Chairman of the Highways Committee and as Chairman of the Gas Committee." It was decided that the fine should be remitted.

Water-Works Extensions at Exeter.—It was decided by the Exeter Council last Tuesday week to apply to the Local Government Board for sanction to a loan of £7700 for improvements of the water-works. The scheme, which was prepared by the City Surveyor, provided for the duplication of the pumping machinery, extension of the filter-beds, and provision of a clear-water well. Mr. Varwell, who presented the report on behalf of the Water Committee, explained that in the original report it was proposed that four Rees "Roturbo" pumps, each capable of raising 500,000 gallons a day, should be put down. The Committee, however, recommended one pump of 1,000,000 gallons capacity and another of 500,000 gallons, which would effect a reduction in the cost from £1204 to £650. They had also decided to dispense with two of the meters which it was originally intended to provide. The result was to reduce the estimate from £8824 to £7700. It had been decided to drive the plant by electric power. With reference to the cost of current, it was stated that the charge was not yet fixed; but the Electricity Committee were considering the question of supplying it for ¾d. per unit.

Weymouth Consumers' Gas Company.—So far as the sale of gas was concerned the past half year was a very satisfactory one, the Directors remark in their report to be submited to the shareholders on Thursday; the quantity sent out being 78,541,200 cubic feet, which is in excess of that of the corresponding half of 1913 by 4,795,500 cubic feet—being an increase of 6·5 per cent. The gas rental consequently showed an advance of £719; while the meter and stove rental was better by £153. The market for residuals was a bad one; coke, tar, and ammonia all yielding less—the total drop being £1257. Coal cost nearly £560 more—attributable to the increased quantity used and to the heavier cost of transport. The amount spent upon other items having, however, been reduced, the total expenditure is slightly less. The Directors recommend a dividend of 5 per cent. per annum. For the year 1914 the output of gas was 147,818,900 cubic feet, or an increase of 9,686,400 cubic feet upon 1913—equal to 7 per cent. Since the last general meeting, Mr. D. F. Colson has resigned his position as Engineer and Manager of the Company—to take up duty as Commanding Officer of the Dorset (Fortress) Royal Engineers—and Mr. T. F. Canning, Assoc.M.Inst.C.E., has been appointed in his place.

Presentations to British Gas Light Company's Employees.

At the Etruria works of the British Gas Light Company, Limited, a few days ago, an interesting presentation took place of long-service medals, accompanied by framed certificates, to six officials and workmen. The awards were made to those who had served the Company for a period of twenty-five years and upwards. Mr. Harold E. Copp (Engineer) presided, and was supported by Mr. J. Warrillow (Assistant-Engineer), Mr. H. M'Gilchrist (Chief Clerk), Mr. S. Watson (late Manager of the Tunstall works), and Mr. J. Pemberton (District Inspector at Tunstall), who was also one of the recipients, and a number of workmen who were old medallists. Prior to the distribution of medals, the men were entertained at tea. Mr. Copp, in making the presentation, said how much the Directors appreciated the long and faithful service of their employees, and commented on the good relationship and cordiality which existed between all of them. On the proposition of Mr. Pemberton, seconded by Mr. Tute, a hearty vote of thanks was passed to the Directors for their kindness, and for the considerate way in which they had always treated the employees.

Canterbury Gas and Water Company.

This Company's capital account (so far as the gas portion of the business is concerned) showing now a balance overspent of £3544, the Directors, at yesterday's ordinary general meeting, asked the proprietors to sanction the issue of further loan capital, of which they have power to borrow up to £9000 additional. The sales of gas increased last year by nearly 10¾ million cubic feet (7 per cent.) over 1913. The total quantity sold approximated to 161¼ millions. During the twelve months 309 million gallons of water were pumped into the district. The balance of the revenue account, £9612 (viz., £4926 from gas, and £4686 from water), added to the balance unappropriated of the profit and loss account totals £17,035, and will allow a dividend to be paid at the rate of 8¾ per cent. per annum, and a carry-forward of some £5700. Dealing with general matters in their report, the Board say they regret to announce that, owing to the exceptional circumstances arising out of the war, whereby freight and insurance on coal was enormously increased, as well as the serious drop in the prices realized for coke and sulphate of ammonia, they have been compelled to make to ordinary consumers the "very moderate rise" of 2d. per 1000 cubic feet, as from the Michaelmas quarter. As to the water undertaking: "There has been a very considerable increase in the consumption of water during the past five months, chiefly due to the large influx of troops into the city since the commencement of the war. Notwithstanding the extraordinary demand, the supply in the wells and the pumping power at the works have proved quite equal to the call made upon them. Unfortunately, however, for the finances of the Company, the increased revenue derived therefrom is comparatively very small, as, in the case of the troops billeted in private houses, where there has been a large increase in the quantity of water used, the Company are unable to make any extra charge—the water-rates being governed by the rateable value."

Quality of the Gas at Richmond.

A report from the Highways Committee, with reference to an alleged deficiency in the illuminating power of the gas, was considered at a recent meeting of the Richmond (Surrey) Corporation. The report (which was adopted) stated that a Sub-Committee had had an interview with the Deputy-Chairman and the Engineer and Manager of the Gas Company, and that the matter was still under consideration. Alderman Simpson (the Chairman of the Committee) said they had not yet finished their inquiries; but certain questions had been put to him with regard to the matter. The first was, What is the agreement with the Richmond Gas Company? This agreement was made on May 24, 1912, when the price of gas for the lamps and rent for the standards was £3 per annum. This was reduced to £2 15s. per lamp; and the agreement would expire on Jan. 1, 1917. The Brentford Gas Company charged £2 19s. 2d. per lamp; and their agreement expired in 1921. Later in the meeting, Mr. Towers moved, "That, owing to the unsatisfactory supply of gas, it be an instruction to the Highways Committee to inquire and ascertain whether the cost of lighting and maintaining the street-lamps with electricity would be more economical than the present system." He said he thought, as the Council were paying the Richmond Company six-and-a-half times what they paid the Brentford Company, the former were treating them very badly. In November, according to the official report of Mr. Huntley, the testing was unsatisfactory; and in December the quality of the gas was bad. They had complained to the Company, who replied that it was owing to the fact that they had to take any coal they could get. After this, a Sub-Committee met representatives of the Company, when a different explanation was made. They doubted the accuracy of the official tests of Mr. Huntley, and suggested that the deficiency might be caused by naphthalene in the pipes. Alderman Simpson said the matter was at the present time under the consideration of the Sub-Committee; and it would be better if they were allowed to report before it was discussed further. The motion was, however, carried.

Reduced Discounts at Ashbourne.—In connection with the financial side of their gas undertaking, the Ashbourne Urban District Council have adopted a recommendation of the Gas Committee that as from April 1 next the discount to ordinary consumers should be reduced by 2d. per 1000 cubic feet, and that to users of prepayment meters from 5 to 2½ per cent.

Yeadon and Guiseley Gas Company.—The annual report of the Directors of this Company shows total earnings for the year amounting to £18,659—a decrease of £766. The net profit is £4289, out of which dividends at the rates of £11 10s. and £8 1s. per cent. are recommended. The new expenditure on capital account is £5436; making the total outlay on the concern £69,797. At the annual meeting dividends at the rates named were declared; and the Directors and shareholders inspected the new retort-house, and witnessed the method of discharging and re-charging the retorts. The cost of the new installation was £15,000.

Shanklin Gas Company.

Presiding at the annual meeting of the Company, Mr. Francis Cooper remarked that this was the first occasion during his long connection with the undertaking (extending over thirty years) on which he had had to report a decrease in the sale of gas as compared with the preceding twelve months. This had clearly been brought about by the serious loss sustained by the town owing to the war. Favourable contracts for coal had been made; but the high price for freightage had upset everything, and the Directors would have to take nearly £600 from the balance on profit and loss account wherewith to pay the dividends recommended. Some 25 per cent. of their men had joined the Colours. All dependants were receiving financial assistance to the extent of making up the difference between Government pay and their usual earnings, and their positions were being kept open for them pending their return at the end of the war. The employees also had been generously assisting the Prince of Wales's Fund, by subscribing 2d. in the pound on their wages since the beginning of the war. The Directors had endeavoured to be patriotic by keeping down the price of coke as long as possible; and they would not increase the price of gas unless they were absolutely obliged to do so. The report (which was adopted) stated that the balance standing at the credit of profit and loss account amounted to £1796; and a dividend for the half year was recommended at the rate of 5½ per cent., less income-tax.

The Drought in the Weardale and Consett District.

In moving the adoption of the Directors' report at the annual meeting of the Weardale and Consett Water Company, Mr. A. F. Pease, who presided, said that, for the first time for many years, the accounts showed a reduction of profit, consequent on the severe drought which lasted for more than eighteen months. There had been a decrease in revenue to the extent of £6529; and it was difficult to state how much of it was due to a natural falling off in the requirements as compared with 1913. When a full supply was available, the daily consumption in 1914 was not as large as during 1913. After mentioning that, at present, all the Company's reservoirs were full to overflowing, he explained that they had incurred an expenditure of £9927 in emergency measures, which they intended to write-off the present accounts, as none of the works would increase the revenue of the Company in the future. They had never divided their profits up to the hilt, but had laid by a reserve to meet an unfavourable year. Still, they had never looked to have a drought such as they had recently experienced. The total amount they recommended to be paid in dividend, including the provision for income-tax, was £65,811. The net profits for the year were £52,956; and they had to encroach on the carry-forward of £39,112 to the extent of £12,859, which was approximately the cost they were put to in consequence of the drought and the estimated diminution of revenue of about £4000. They had never paid their maximum dividend on the ordinary stock, and holders of new stock under the amalgamation had never got anything like 7 per cent. He was expecting to be asked why the Directors did not exercise their powers for a new reservoir contained in the Bill of 1902. When the Bill was passed, it was the intention to proceed at once on what was known as the Beldon reservoir, and they started to sink a considerable number of holes to ascertain the best position; but they found it would be impossible to construct a water-tight reservoir on the site. While examining the position, certain information came to them which indicated the probability that the quantity of water required for manufacturing purposes in the district was likely to diminish, owing largely to the introduction of electricity and other causes. It seemed at one time that the construction of a new reservoir might be making provision for water which would never be required at all. The Board were prepared to spend money liberally; and they regretted the inconvenience caused to people in the district. They arranged for a temporary supply to Chester-le-Street from Newcastle, and endeavoured to obtain a supply from the Tees Valley Water Board, and to get leave to pump from the River Derwent. It was intended to revise, with slight modifications, the scheme to have a reservoir at Burnhope, and to carry a large pipe line through to Wheatley. The scheme was a costly one; but it would enable them to take advantage of a new waterway area, and one on which the rainfall was on the average much heavier than it was further east. Provision would be made for practically 50 per cent. increase on their present quantities. They anticipated the pipe-line would take two or three years to build, and would cost £250,000, in addition to which the reservoir cost was estimated at £417,000. The report was adopted, and a dividend of 4 per cent. on the preference stock and at the rate of 7 per cent. for the year on the ordinary stock was declared.

Larger Sale at Bishop's Stortford, Harlow, and Epping.—It is stated in the report which is to be presented at to-morrow's meeting of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company that for the half year ended Dec. 31, the sale of gas, as compared with the corresponding period of the previous year, shows an increase of 3,812,700 cubic feet, or 6·2 per cent.; but the income from residual products has been seriously affected by the lower prices realized. The balance to the credit of the revenue account for the half year is £3502. After charging £599 for interest, income-tax, &c., and the contribution of £105 to the National Relief Fund, an amount of £2798 is added to the profit and loss account, which, with £201 brought forward from the previous half year, makes the balance available £2999. For the payment of dividends at the authorized rates, it will be necessary to take £295 from the reserve fund. The Directors recommend the declaration of dividends for the half year at the statutory rates per annum of £5 14s. per cent. on the "A" ordinary stock, 5½ per cent. on the "B" ordinary stock, 5 per cent. on the "C" preference stock, and 4 per cent. on the "D" preference stock. The contracts for coal made in the early part of the year having been suspended owing to the war, the Directors have been compelled to purchase further supplies at prices which represent an increase of more than 6s. per ton over the prices paid in 1912—equivalent to more than 6d. per 1000 cubic feet of gas sold. As this necessitated raising the price of gas, the Directors have given the requisite notice of an increase of 3d. per 1000 feet.

Walker and Wallsend Gas Company.

In moving the adoption of the report and accounts at the annual general meeting of the Company, Mr. C. J. Potter, who presided, said that the gas sales for the year had reached 292 million cubic feet, which was the largest ever recorded. It showed an increase of a little over 3 per cent. on the previous year. The revenue from the sales of gas had increased by £1226; but the price for residuals had had a serious drop, the total increase having amounted to £2244. The revenue had decreased by £1222, while the expenditure had increased by £796, mainly owing to the war. The Directors thought it advisable to insure the Howdon Lane works, as from November last, against all war risks, to the amount of £25,000; the premium for one year being £250. They had also subscribed £100 to the Prince of Wales's Fund. The Directors recommended the full statutory dividend, and that a further £500 from the year's surplus profits be placed to the credit of the insurance fund, which augmented the account to £6714. This left a balance of surplus profit of £417 to carry to the net revenue account. The accumulated balance of surplus profits now stood at £11,977, which was equal to one year's obligation for interest and dividend. Taking the accounts as a whole, the Company appeared to be in a very sound position. Up to date this year, the gas sales had continued to show a satisfactory increase. They did not look for any heavy capital expenditure during the year. The report was adopted; and dividends for the half year ended Dec. 31 were declared upon the preference stock at the rate of 5 per cent. per annum, upon the 3½ per cent. consolidated stock at the rate of £4 12s. 6d. per annum, and upon the 5 per cent. ordinary stock at the rate of £6 2s. 6d. per cent. per annum.

Effect of Billeting at Aberystwyth.—Six months ago, looking forward to adverse conditions consequent upon the outbreak of war, the Directors of the Aberystwyth Gas Company expressed the conviction that "owing to the excellent condition of the works and plant throughout, maintenance charges would be less than normal." This prediction has, they state in their report just issued, been fulfilled; and it is principally due to these reduced costs that the present most favourable balance of profit is attributable. But not altogether; for in the middle of December, a very large number of troops were billeted upon the householders of Aberystwyth, with the result that for two weeks the sale of gas increased by as much as 70 per cent. in excess of the ordinary mid-winter demand. That the works and mains were able to cope with this sudden, enormous, and almost unique demand so satisfactorily, is, they say, the most convincing testimony possible to the efficiency of the property at all points. The increased business has naturally entailed a great strain upon the Manager (Mr. J. Gaunt), the Secretary (Mr. W. J. Fearnsides), and the employees generally; and the Directors take this opportunity of expressing their obligations to one and all. The balance of profit amounts to £1606, out of which the Directors recommend the payment of the statutory dividends.

Water Supply of Newcastle and Gateshead.

The annual report of the Directors of the Newcastle and Gateshead Water Company states that the gross receipts amount to £222,294, and the expenditure and working charges (including management and maintenance) to £56,404, which leaves a balance of profit of £165 890. To this is added the balance brought forward from the previous year (£5646), which gives a total of £171,536. The Directors recommend that final dividends be paid for the half year ended Feb. 1 of 5 per cent. per annum on the preference stock, at the rate of 9½ per cent. per annum on the consolidated ordinary stock (making with that paid in August last 8¼ per cent. for the year), and at the rate of £6 13s. per cent. per annum on ordinary stocks under the Acts of 1876 and 1898 (making with that paid in August last £5 15s. 6d. per cent. for the year). There will then remain a balance to be carried forward of £11,340. The capital expended during the year, apart from ordinary pipe extensions, is £2310. The electric plant and pumping main for the supply of High Mickley has been brought into use during the year, and a supply is now being given to that district. The Directors in their last report drew attention to the continuous drought during 1913 (from May 17 until Oct. 9). This was followed last year by a still longer drought, from April 1 to Oct. 30, a period of 213 days. At the latter date the water in store was equal to 109 days' consumption. The reservoirs have again been fully replenished. The Board regret to report the death of Mr. Thomas Bell, and place on record their appreciation of his valuable services as a Director of the Company for 25 years.

Boston Water Supply.—At the recent annual meeting of the Boston Water Company, a dividend of 8 per cent. was declared and £200 voted to the Directors for their services during the year. The Chairman (Mr. B. B. Dyer) remarked that the Company had been severely and unjustly criticized by a certain section of the Press and by the Corporation and others; but, at very considerable expense, they had succeeded in providing the consumers with a regular supply of good water.

Weston-super-Mare Gas Company.—The report of the Directors, to be submitted to the stockholders at the ordinary meeting to be held next Friday, points out that the sales of gas during last year show an increase over the corresponding twelve months of 1913 of 4,648,300 cubic feet, or 2·06 per cent.; and, in view of the exceptional conditions prevailing since the commencement of the war in August last, the Directors consider this result to be extremely satisfactory, as a decrease in the sales of gas had been regarded as almost inevitable. The Directors recommend the payment of the maximum dividend of 5 per cent. on the ordinary stock, less income-tax. The report mentions that, after a period of some 30 years' service, Mr. J. H. Gray, the Engineer, sent in his resignation; and the question of appointing a new Engineer was receiving the attention of the Board. Since the issue of the report, it has been announced that Mr. James Taylor, of Mossley (Lancs.), has been selected for the position.

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Colne Valley Water Company.

At the half-yearly meeting of this Company last Tuesday, the Directors reported that the balance of the dividend and interest account, after paying interest on the debenture and preference stocks, and transferring £1000 to the contingency fund, was £26,727. Out of this they recommended the payment of the full statutory dividends at the rates of 10 and 7 per cent. per annum on the several classes of ordinary stock, and in addition a payment of 1 per cent. (actual) on account of back-dividends on the "A," "B," and "C" stocks; leaving £12,736 to be carried forward. The capital expendiure amounted to £4322, which included payments in respect of the new beam-engine at the Eastbury pumping-station, the laying of a trunk main to Ruislip, and several extensions of mains for affording new supplies to consumers. During the half year the Company laid 4¼ miles of mains in Wembley, Ruislip, and other parts of their district, required in connection with the development of new estates; bringing up to 276½ miles the total length of mains throughout the area. The new beam-engine had passed most satisfactorily its efficiency trials, and made a valuable addition to the other pumping units possessed by the Company. Supplies had been provided for the erection of 223 buildings; while 352 new supplies had been added to the Company's books. For the entire year the percentage of empty houses was only 2·61—the lowest recorded in the Company's history. In connection with the war crisis, some 60,000 troops were provided with water during the half year; and the arrangements made by the Company received the warm approval of the War Office authorities.

Loughborough Slot-Meter Robbery.—In a case dealt with by the Magistrates at Loughborough, last Wednesday, it was shown that the defendant, Florence Robbins, a married woman, who was charged with stealing 7s. 10d. from a Corporation prepayment meter, had treated the apparatus as if it were a kind of money savings box. She admitted that she had abstracted the amount to pay her rent, and offered to refund it. The Gas Committee, however, regarded the case as one which should be brought before the Court, as a warning to others; and, with this view, the Magistrates bound her over, ordering her to repay the money, with costs.

The Damage to the Hartlepool Gas-Works.—The Directors of the Hartlepool Gas and Water Company, in their annual report, state that during the German bombardment on Dec. 16 all the gasholders were struck and pierced by shells, causing the loss of the whole of the gas in stock, and temporarily depriving the district of its supply—from 8 o'clock on the Wednesday morning until 6 o'clock on Friday evening. Eight of the Company's employees were injured, and one had since died. As far as can at present be ascertained, the loss and damage sustained is about £7500; and a claim in this respect has been forwarded to the Committee appointed by the Government to deal with such claims.

Sunderland and South Shields Water Company.—It is stated by the Directors in their report for the year 1914 that the revenue from water-rents (amounting to £114,755) shows an increase over the previous twelve months. Dividends for the half year are recommended which (with the interim distribution) will make a total for the year of 9 per cent. on the ordinary and preference stocks, £6 6s. per cent. on the additional capital stock, and 4½ per cent. on the additional ordinary capital stock. The length of mains laid last year was 2010 yards, making a total of 390·21 miles in the Company's area. Mr. R. H. Gayner, who had been Chairman for nearly twelve years, resigned this position in February last, and Mr. W. F. Vint was elected in his place. The Directors record their high appreciation of the valuable work of Mr. Gayner on behalf of the Company, and are pleased to report that his services are still continued on the Board. The new Chairman presided at the annual meeting last Thursday, and, in moving the adoption of the report and accounts, said that, so far as the Company's affairs were concerned, the year had been one of quiet progress. He paid a generous tribute to the value of the services rendered by Mr. Gayner, and spoke appreciatively of the labours of the officials of the Company. He added that the Directors had subscribed £250 to the National Relief Fund, and expressed the belief that their action would meet with the approval of the shareholders. They showed their acquiescence by applauding the remark. The report was adopted, and the dividends recommended were declared.

Croydon Gas Company.—The report of the Directors to be submitted at the half-yearly meeting of the Company next Friday states that, notwithstanding the reduction in street and shop lighting, due to regulations made under the Defence of the Realm Act, the sales of gas slightly exceeded those of the corresponding period of 1913. The number of consumers has increased in the half year by 830. The number of stoves on hire is greater by 678 cookers and 2008 fires, while 30 and 309 respectively have been sold to consumers, representing a total increase in gas-stoves of 3025. The Directors with much regret found it necessary to increase the price of gas by 1d. per 1000 cubic feet from and after the date of recording the September meter-indices. £10,000 of "D" (5 per cent.) stock was issued by tender in October, and £15,000 in December, at average prices of £102 2s. and £101 0s. 5d. per £100 respectively. A show-room and district office with workshops have been erected at Norbury, to meet the needs of the growing number of consumers in the neighbourhood. This show-room will shortly be opened. Land has also been acquired at the rear of the district stores and workshops at Wallington, to permit of a much-needed extension there. Over 120 co-partners in the Company's service are with His Majesty's Military or Naval Forces. After providing for all fixed charges, there remains available for division a balance of £34,149; and the Directors recommend that dividends for the half year be declared at the rates per annum of 15 per cent. on the "A" stock, 12 per cent. on the "B" and "C" stocks, 5 per cent. on the "D" stock, and 10 per cent. on the "E" stock—all less income-tax. This will absorb £23,802, leaving £10,347 to be carried forward.

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Toluol from Cardiff Gas.—We learn from the "South Wales Daily News" that the Government have made arrangements with the Cardiff Gas Company for the supply of all the toluol that can be extracted from their gas; the Government providing the necessary washing plant and the extra apparatus, and a proper substitute for the extracted toluol. The Directors of the Company are anxious to help the Government in every way; and they will start the process as soon as the makers can deliver the necessary stills, as the Company already have the washers and other plant ready.

Wolverhampton Gas Company.—The half-yearly accounts of the Company to Dec. 31 show a net profit of £7854. This, added to the balance brought forward, enables the Directors to recommend payment of dividends at the same rates as last half year—3 per cent. upon the preference stock, 5⅛ per cent. upon the consolidated stock, and 3⅛ per cent. upon the new ordinary stock, less tax, and to carry the balance of the excess dividend undivided (£459) to the reserve fund, as authorized by their Act. They further recommend that £432 be placed to the reserve fund, and £57 to the insurance fund.

Price of Gas at Stalybridge.—Submitting the Gas Committee's minutes at the meeting of the Stalybridge Town Council, Mr. Cook remarked that the reduction in consumption was a "very serious matter." It was not proposed to recommend an advance in the price of gas before the March quarter; but it was a certainty that there would have to be a rise afterwards. Instead, however, of asking people to use more gas, in order to bring up the consumption, he would like to ask them to be as careful as they could, because the Committee had very great difficulty in securing coal, and this difficulty would increase.

Reduced Price and Increased Consumption at Merthyr Tydfil.—Dividends at the rates of 5 per cent. per annum on the preference stock and £5 7s. 6d. on the consolidated ordinary stock (both less income-tax) were declared at the annual meeting of the Company. The Chairman (Mr. H. F. W. Harries) said £2669 had been expended on replacement and maintenance of works and plant, and £2356 on mains, services, and meters. The revenue account showed a balance of £4994, as against £5115 in the previous year—a comparatively small diminution having regard to the fact that in the second half of 1914 the price of gas had been reduced from 2s. 8d. to 2s. 6d. per 1000 cubic feet, and to a very serious decrease in the amounts received for residual products. A comparison of the accounts for 1913 and 1914 showed that, notwithstanding the reduction in price, the receipts for gas increased £660; but the returns from the sale of residuals had fallen from £5262 to £4544, or from 66·25 to 55 6 per cent. of the cost of the coal, though the stocks available for sale were larger. The policy of the Directors in reducing the price of gas had been fully justified, as it had encouraged the consumption; the sales having increased by no less than 9,790,000 cubic feet. The reduction in price and the increasing prosperity of the Company were due to improvements in manufacture and economies of management and working, rendered possible by the erection of the new works, and to the skilled and careful supervision of the Manager (Mr. J. E. Kenshole).

Long Eaton Gas Company.—The principal feature in the report presented to the shareholders of the Long Eaton Gas Company at their meeting last Thursday was the reference to the Company's success in their action against the District Council in regard to the latter's revised charges for electricity, which seriously affected the interests of the Company. The Directors were advised that they were illegal, and made a formal protest. After offering in vain to submit the dispute to arbitration, they took steps to test the matter at law; and a clear judgment was given against the Council, and, moreover, was upheld on appeal. The accounts for the past year, which accompanied the report, showed a balance of £7268 carried to the profit and loss account, and £4868 available. The Directors recommended the payment of final dividends of 4 per cent. on the "A" stock and 3⅛ per cent. on the "B" stock, making with the interim dividends 6⅛ and 5⅛ per cent. respectively, free of income-tax, and the addition of £500 to the reserve fund—leaving the balance to be carried forward.

Wellingborough Gas Company.—At yesterday's meeting of the Company, the Directors submitted to the shareholders a favourable statement of accounts for the half year ended Dec. 31. In accordance with a resolution passed at the last meeting, a contribution of £100 was made to the National Relief Fund; and the Directors have also made weekly allowances to dependants of employees of the Company on active service. The sale of gas shows an increase of nearly 7 per cent. over the corresponding period of the previous year; and considering the serious fall in the prices of coke and sulphate of ammonia, the profit is regarded as quite satisfactory. With a view to increasing the sale of modern and efficient gas-fittings and appliances, and bringing before the public the many advantages of gas for lighting, heating, cooking, and power, the Directors have secured a lease of premises in the centre of the town, which will shortly be opened as a show-room. The Directors recommend that dividends of 6⅛ per cent. on the original shares, and 5⅛ per cent. on the additional shares, less income-tax, be declared for the half year.

North Middlesex Gas Company.—Compared with the corresponding period of the preceding year, the sale of gas by the Company during the six months ended Dec. 31 shows an increase of 2,558,900 cubic feet, or 1·7 per cent., and the revenue from residual products a reduction of £943. The Directors stated in their report that the net profits for the last half year, after charging interest, income-tax, the balance of cost of the Provisional Order, and contributions made to the War Funds, amounted to £4658, which, with £4768 brought from the previous half year, made the disposable balance £9426. They recommended the declaration of dividends for the half year at the following rates: 5 per cent. per annum on the preference capital, 11 per cent. per annum on the original ordinary capital, and £7 14s. per cent. per annum on the additional ordinary capital. This will leave a balance of £4662 to be carried to the credit of the profit and loss account for the current half year. During the six months, 500 additional ordinary £10 shares were issued, and the sum realized (£7000) has been placed to the credit of the capital account.

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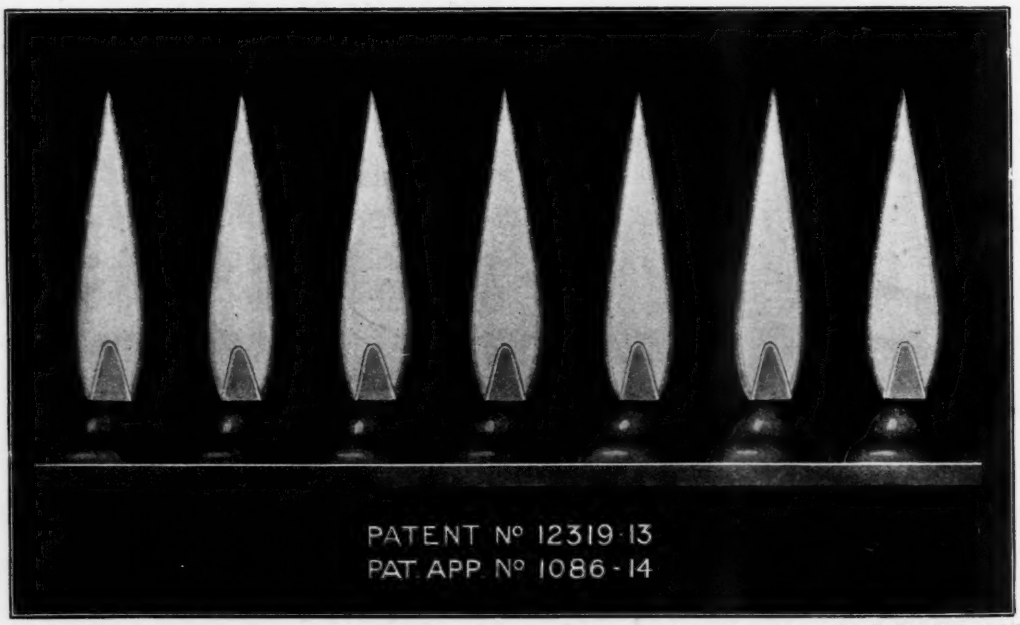

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Lostwithiel Gas Company.—It was reported at the annual meeting of the Company that the profit for the year was £223; and it was decided to pay dividends of 7s. 6d. on the "A" shares and 1s. 6d. on the "B" shares. The Mayor (Mr. J. H. Jeffery), who presided, remarked that the outlook for the supply of coal was very serious; but they had enough in stock to last some time, and would give the consumers the benefit. Mr. H. E. Riley (the Engineer of the Company) stated that new methods for advancing the interests of all concerned were being considered.

Liverpool Water Supply.—The Water Committee of the Liverpool Corporation have ordered a report submitted by the Consulting Water Engineer (Mr. Joseph Parry, M.Inst.C.E.), on the question of the construction of a third pipe-line from Lake Vyrnwy, to be printed and circulated among the members of the City Council. The Committee have also passed a resolution to request the Council to authorize the preparation of a Bill for presentation to Parliament in the session 1915-16 for obtaining the necessary borrowing powers to enable a third instalment of water to be brought from Lake Vyrnwy, and for such other powers as may be necessary in connection therewith.

North Shore Company's New Works.—Great progress has been made with the erection of the new works of the North Shore (Sydney) Gas Company, Limited, at Oyster Cove, in the two years during which the work has been in progress. The purifiers, governor-house, and meter-house have been completed; and a holder with a capacity of 1¾ million cubic feet is being put up. Other portions of the plant include a water-gas installation and coal-storage bunkers to hold 12,000 tons. Electric elevators will raise the coal from the holds of the colliers to the bunkers, from which it will be carried as required to feed from above the eighty continuous system vertical retorts, the coke from which will be discharged into trucks below. With this mechanically operated arrangement it is estimated that three men will do the work now requiring about 28 men to carry out.

St. Austell Gas Undertaking.—The report of the Directors to the annual meeting of the Company stated that the sales of gas increased by 1½ million cubic feet, and the number of consumers by 82, making a total of 489 ordinary and 797 prepayment consumers. Fortunately, the Company were in a good position in the matter of coal supply at the outbreak of the war; but it had since been increasingly difficult to obtain supplies, and the outlook was causing the Directors great anxiety. It was recommended that £105 be taken from the reserve fund and added to the balance of profit of £828, and that dividends of 8½ per cent. be paid on the old shares and 7 per cent. on the new shares. The Chairman (Mr. W. M. Coode) stated that the coal contracted for last year could not now be obtained, and small quantities which they purchased to keep things going cost about 10s. per ton more than they previously paid. Last year they were unable to earn sufficient to pay the full dividends; and there was no doubt that in the coming year shareholders and consumers would have to share the burden of the increased cost of raw materials. The report was adopted and the dividends recommended declared.

The Directors of Messrs. Fletcher, Russell, and Co., Limited, of Warrington, at a meeting held last week, unanimously elected Mr. J. H. Kemp, who has been for many years, and now is, their Northern representative, to a seat on the Board in place of the late Mr. Settle.

The Huddersfield Gas Committee have considered correspondence with the Municipal Employees' Association, and have resolved that the wages of labourers be increased to 7d. per hour, and that the wages of the enginemen, scarifiers, and boilermen be referred to the Executive Sub-Committee to consider and report.

The Redcar Gas Company have suggested to the Redcar Urban District Council that automatic controllers should be fixed to the lamps in the streets, and that the lights should be switched on and off at the gas-works; thus doing away with the present method of lighting by hand-torch. The communication embodying this suggestion was considered by the Council at their last meeting, when it was decided that no action should be taken for the present in regard to it.

In the early part of last month, the West Ham Education Committee, in order to avoid the expense of laying long lengths of gas-piping, which would be necessary to provide a supply of gas to certain rooms in the Rosetta Road School, decided to instal electric cookers. The architect has now reported upon the matter; and in view of the large initial outlay which would be involved in carrying out the proposal, the Committee have been recommended to abandon the scheme and instal gas-heated grillers.

The Barnes Urban District Council, who own some workmen's dwellings, have, it is reported, decided to instal electric cooking apparatus in all of them; the current to be supplied at ¾d. per unit. The type of apparatus recommended by the Council's Electrical Engineer is a small oven, with a boiling-plate fitted on the top or at one end. The cost of installation, including wiring and fitting charges, is estimated at £4 per cottage. Prepayment meters are to be used; and the charge will be so adjusted as to cover maintenance and secure the repayment of the capital expenditure at the rate of about 3s. 6d. per quarter—the life of the apparatus being taken at eight years.

At an informal meeting of employees held at the gas-works, Redhill, last Wednesday evening, with the view to opening a debate on the subject of co-partnership, Mr. Horace Long, the Secretary to the Gas Company, submitted a suitable communication. In the course of it he said the true spirit of co-operation engendered a sense of proprietorship, and fostered self-respect and self-reliance, and, in a word, built-up individuality. With a view to the avoidance of disputes between employer and employed, one or two Bills had during recent years been presented in Parliament, embracing the idea of co-partnership. He contrasted the compulsory adoption of the co-partnership method through the medium of the Legislature and the voluntary adoption of the principle, with the enthusiasm and zeal of the volunteer as compared with that of the conscript army. Mr. Long (who is Secretary also of the Gas Company) concluded with the following quotation, among others, from the writings of the late Sir George Livesey: "The dispute between capital and labour has to be settled; co-partnership is the final and only solution."

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According to the Pontypridd representative of the "South Wales Daily News," the Government have been in communication with certain Welsh coalowners who have bye-product plants connected with their undertakings; and, as a result, experiments are being made at several of the South Wales collieries to ascertain the possibilities of producing toluol from tar extracted from Welsh coals. The Newport Gas Company have received intimation from the Government that the war authorities will require certain of their bye-products with a view to the manufacture of explosives. Inquiries made in the Monmouthshire Western Valleys go to show that the yield of bye-product at the respective local gas-works would not be sufficient to warrant the erection of the necessary plant for the extraction of toluol.

APPLICATIONS FOR LETTERS PATENT.

2004.—CHELL, J. A., "Lamps for gas." Feb. 8.
2037.—JONES, E., "Generating gas." Feb. 9.
2090.—HICK, H. J., "Gas-engines." Feb. 9.
2130.—HOBBINS, G., and HUNT, W., "Gas and electric light protector." Feb. 10.
2197.—RATCLIFFE, J., "Purifying gas or arresting corrosion." Feb 11.
2207.—MILLER, A. J., "Bunsen burners." Feb. 11.
2340.—FIDDES, W. J., "Charging and discharging retorts, conveying coal, &c." Feb. 13.

GAS COMPANIES IN THE STOCK EXCHANGE.

The Stock Exchange was not able to quicken-up business last week; the would-be investor exhibiting a cautious mood and adopting an attitude of "wait and see." The general tone, however, was not bad on the whole, although there were ups and downs in various markets. Government issues were fairly firm; but Rails were not at their best. Americans were kept down by the German piratical menace, which demands diplomatic but firm handling at Washington. Within the Stock Exchange, one or two interesting points concerning restrictions upon dealings under the existing rules were under discussion, and also more stringent regulations were made as to the admission of ex-foreigners to membership. Mr. Lloyd George's speech foreshadowing huge war expenditure created an impression, but was received with calm. In the gas industry, the further reports and accounts which have been issued in the week tend on the whole to support the general feeling of satisfaction inspired by their predecessors. Business in gas securities was fairly good, and prices were well maintained.

The bargains done for cash during the week were as follows: On Monday, Croydon "B" 215, ditto "C" 215, 216, Gas Light ordinary 91¼, 92, 93¼, ditto preference 90, 90¼, 90⅜, 90⅝, 91, Primitiva 4¾, ditto preference 4 7/16, 4½. On Tuesday, Gas Light ordinary 91⅛, 92, ditto maximum 70¾, ditto debenture 71½. Primitiva 4¾, ditto preference 4⅝, South Metropolitan 97½, 98¼. On Wednesday, Brentford new 98½, 99, Gas Light maximum 71¼, ditto preference 91, 91⅛, ditto debenture 71, 71¼, Primitiva 4 17/32, South Suburban 108. On Thursday, Alliance and Dublin 66¼, 67 5/16, Commercial 4 per cent. 98½, Gas Light ordinary 91⅛, 91⅞, 92, 92¼, ditto maximum 72, ditto debenture 71, 71½. Imperial Continental 83, Primitiva preference 4 13/32, South Suburban 109. On Friday, Croydon "C" 210, 211, Commercial 4 per cent. 98½, Gas Light ordinary 91⅜, 92¼, ditto maximum 71⅜, Primitiva preference 4½, ditto debenture (1911) 72. On Saturday, Oriental 110. The Money Market was unchanged.

Bank rate (fixed Aug. 8) 5 per cent.; last year, 3 per cent.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING FEBRUARY 20.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.		£ s. d.		
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59–64	3 18 2	66¼–67 3/16
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76–79	5 1 3	..
280,000	5	April 29	7½	Bombay, Ltd.	5¼–6⅜	5 17 8	5¼
50,000	10	Feb. 26	16	Bournemouth Gas and Water — 10 p.c.	29–30	5 6 8	..
373,480	10	,,	7	Bournemouth Gas and Water — B 7 p.c.	15–15½	4 10 4	1¼–14⅜
95,000	10	,,	6	Bournemouth Gas and Water — Pref. 6 p.c.	13½–14	4 5 9	13 7/16
—	—	—	—	Bournemouth Gas and Water — Deb.	..	—	93–93½
380,000	Stk.	Feb. 26	14	Brentford Consolidated	261–266	5 5 3	.
330,000	,,	,,	11	Do. New	204–209	5 5 3	93½–93x
50,000	,,	,,	5	Do. 5 p.c. Pref.	109–111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91–93	4 6 0	..
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208–213	5 3 4	.
244,200	,,	,,	8	Do. A Ord. Stk.	154–159	5 0 8	145–146
530,000	20	Mar. 26	12½	British	44–45	5 11 1	42–42¼
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88–90	4 8 11	..
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85–87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1½–2½	—	..
100,000	10	—	—	Do. 4½ p.c. Pref.	4–6	—	3½
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70–75	6 0 0	..
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	102–110	4 10 11	.
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106–108	5 1 2	9 16x
566,000	,,	,,	5½	Do. 3½ p.c. do.	103–105	5 1 6	98
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½–71½	4 3 11	..
800 000	Stk.	,,	4	Continental Union, Ltd.	76–79	5 1 3	70½–71
200 000	,,	,,	7	Do. 7 p.c. Pref.	115–118	5 18 8	..
—	—	—	—	Croydon B and C 7 p.c.	..	—	210–216
492,270	Stk.	—	6	Derby Con. Stk.	123–125	4 16 0	..
55,000	,,	—	4	Do. Deb. Stk.	102–104	3 16 11	..
1,002,180	10	July 29	10	European, Ltd.	17½–18*	5 11 1	13½
16,362,910	Stk.	Feb. 12	4/17/4	Gas Light and Coke — 4 p.c. Ord.	98–102	4 15 6	91½–93¼x
2,600,000	,,	,,	3½	Gas Light and Coke — 3½ p.c. max.	76–79	4 8 7	70⅝–72x
4,062,235	,,	,,	4	Gas Light and Coke — 4 p.c. Con. Pref.	96–99	4 0 10	90–91¼x
4,674,850	,,	June 11	3	Gas Light and Coke — 3 p.c. Con. Deb.	72½–74⅛	4 0 6	71–71½
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87–89	5 12 4	84–89½
70,000	10	April 29	11	Hongkong & China, Ltd.	16½–16¾	6 11 4	..
—	—	—	—	Hornsey 7 p.c.	..	—	160
131,000	Stk.	Mar. 12	7 7/8	Ilford A and C	151–154	5 2 4	..
65,780	,,	,,	6⅛	Do. B	115–118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92–94	4 5 1	.
4,940,000	Stk.	May 14	9	Imperial Continental	150–160	5 12 6	83
1,235,000	Stk.	Feb. 12	8½	Do. 3½ p.c. Deb. Red.	84–86	4 1 5	..
200,342	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119–121	5 7 5	..
561,000	Stk.	Feb. 26	10	Liverpool United A	211–213	4 13 11	..
718,100	,,	,,	7	Do. B	146–148	4 14 7	..
906,083	,,	June 26	.	Do. Deb. Stk.	97–99	4 0 10	..

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.		£ s. d.		
75,000	5	June 11	6	Malta & Mediterranean	4½–4⅝	6 9 9	..
250,000	100	April 1	4½	Met. of Melbourne — 4½ p.c. Deb.	99–101	4 9 1	99½–99
541,920	20	May 28	4	Monte Video, Ltd.	11½–12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'teah'd Con.	98½–99½	4 10 6	..
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82–83	4 4 10	..
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14–15	5 2 8	.
300,000	Stk.	May 14	8	Oriental, Ltd.	117–122	6 11 2	110
60,000	5	Mar. 26	10	Ottoman, Ltd.	7½–7⅝	6 9 0	..
60,000	50	Feb. 26	13	Portsea, Island B	128–131	4 19 3	..
100,000	50	,,	12	Do. C	118–121	4 19 2	.
249,980	5	April 29	8	Primitiva Ord.	5⅛–6	6 18 4	4 17/32–4⅝
499,960	5	June 26	5	,, 5 p.c. Pref.	4⅝–5	5 0 0	4⅝–4⅞
521,600	100	June 2	4	,, 4 p.c. Deb.	91–93	4 6 0	85½–86
—	—	—	—	,, ,, 1911	..	—	72x
846,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85–87	4 12 0	85
150,000	10	May 14	6	San Paulo — 6 p.c. Pref.	10½–11	5 9 1	..
125,000	50	July 1	5	San Paulo — 5 p.c. Deb.	47–49	5 2 0	..
135,000	Stk.	Mar. 12	10	Sheffield A	223–224	4 9 3	..
209,984	,,	,,	10	Do. B	222–224	4 9 3	..
523,500	,,	,,	10	Do. C	220–222	4 10 1	..
90,000	10	May 28	9	South African	10½–11½	7 16 6	.
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	111–113	4 16 8	97⅛–98¼x
1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72½–74½	4 0 6	70⅞–71¼
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157–159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114–116	5 3 5	108–109
60,000	,,	,,	5	Do. 5 p.c. Pref.	110–112	4 9 3	..
—	—	—	—	Do. West Kent.	..	—	92½
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116–118	4 4 9	107½
629,740	Stk.	May 14	5	Southampton Ord.	99–102	4 18 0	.
120,000	Stk.	Feb. 12	7½†	Tottenham District — A 5 p.c.	135–138	5 8 8	.
742,275	,,	,,	6†	Tottenham District — B 3½ p.c.	115–117	5 2 7	112
181,255	,,	June 26	4	Tottenham District — 4 p.c. Deb.	87–89	4 9 11	..
182,380	10	Dec. 30	5	Tuscan, Ltd.	5–6	8 6 8	..
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93–95	5 5 3	..
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	105½–109½	4 11 4	..
				Wandsworth, Wimbledon, and Epsom—			
30,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151–156	5 7 4	..
255,636	,,	,,	6⅞	,, B 3½ p.c.	129–134	5 2 7	..
108,075	,,	,,	5/17/3	,, C 3½ p.c.	110–115	5 2 0	..
352,000	,,	,,	6½	Wimbledon 5 p.c.	117–122	5 0 5	..
98,000	,,	,,	6⅝	Epsom 5 p.c.	121–126	5 5 2	..
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66–69	4 6 11	..

x Bargains marked thus were "Ex Div."

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c, Vacant.

DRAUGHTSMAN. C. & W. Walker, Donnington.
JUNIOR ASSISTANT (Laboratory). No. 5994.
FOREMAN FITTER. Sunderland Gas Company.
CLERK. Mansfield Gas and Water Department.
CLERK. No. 5998.

Gas-Works Wanted.

Particulars to "PRINCIPAL," Scripps's Advertising Offices, 13, South Molton Street.

Plant, &c. (Second-Hand), Wanted.

MOUTHPIECES AND HYDRAULIC MAINS. Aylesbury Gas-Works.

Plant, &c., for Sale.

ELBOWS AND TEES. No. 5997.

Sales of Stocks and Shares.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY. London Mart March 9.
FELIXSTOWE AND WALTON WATER COMPANY. London Mart. March 9.
READING GAS COMPANY. Tenders by March 9.
SOUTHEND WATER COMPANY. London Mart. March 9.

Meeting.

HORNSEY GAS COMPANY, 5, Great Winchester Street, E.C. March 12, 3.30 o'clock.

TENDERS FOR

Fire-Clay Goods.

BRIGHOUSE CORPORATION. Tenders by March 13.
BOLLINGTON GAS DEPARTMENT. Tenders by March 9.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by March 2.

General Stores (Fittings, Sulphuric Acid, Lime, Meter Shelves, Ironmongery, Castings, Iron and Steel, Steel Goods, Lead Pipe, Oils and Paints).

BRIGHOUSE CORPORATION. Tenders by March 13.
MIDDLETON CORPORATION. Tenders by March 6.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by March 2.

Ironwork for Underground Tank.

SHEFFIELD GASLIGHT COMPANY. Tenders by March 2.

Meters.

BRIGHOUSE CORPORATION. Tenders by March 13.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by March 2.

Oxide of Iron.

SALFORD GAS DEPARTMENT.

Pipes, &c.

BRIGHOUSE CORPORATION. Tenders by March 13.
MIDDLETON CORPORATION. Tenders by March 6.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by March 2.

Oil for Gas Making.

MANCHESTER GAS DEPARTMENT. Tenders by March 18.

Tank (Excavation and Construction).

SHEFFIELD GASLIGHT COMPANY. Tenders by March 2

Tar.

MANCHESTER GAS DEPARTMENT. Tenders by March 31.